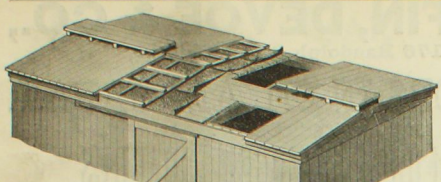

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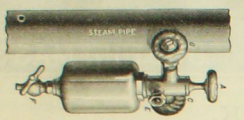

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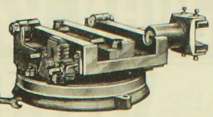

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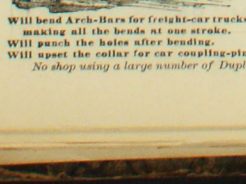

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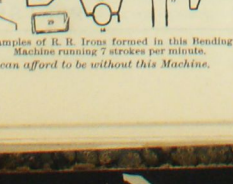

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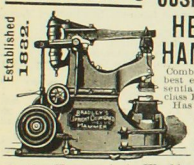

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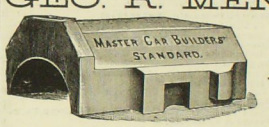

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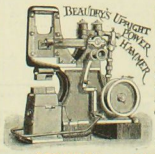

By far the best. Only Hammer having a duplex helve, therefore is most generally useful and durable for machine and drop forging.

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HARRISBURGH CAR MANUFACTURING CO., HARRISBURGH, PA., Oct. 26, 1885.

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Gentlemen: We have made a test in fierce sunlight of about 120 days, of your Domestic and Bougon's Foreign Car Plush sent us last May. There is scarcely any change in *your* color, while Bougon's faded very materially.

Yours truly, GEORGE G. BOYER, *Sup't.*
PATTON.

BOSTON & PROVIDENCE RAILROAD CORPORATION, SUPERINTENDENT'S OFFICE, BOSTON, April 23, 1886.

D. GOFF & SONS—

Gentlemen: Yours of the 21st is at hand. Contents noted. Replying, will say that we are perfectly satisfied with your Plush.

Car No. 52 went into service October, 1884. The Plush in it is in splendid condition. Why not ask people to examine that car?

Yours, etc., A. A. FOLSOM, *Sup't.*

Samples and Price on application to

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AMERICAN SAW CO.

TRENTON, N. J.,

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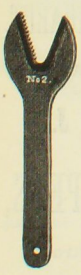

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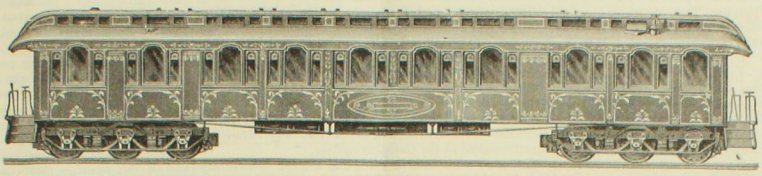


VOLUME XVII. } OCTOBER, 1886. { SINGLE NUMBERS, TEN CENTS,
NUMBER 10. } { $1.00 PER ANNUM.

Miscellaneous Items.

THE Ohio Falls Car Works, at Jeffersonville, Ind., have resumed operations after several years of idleness.

THE first annual report of the Ohio State Forestry Bureau says that in 1853 there were 13,991,426 acres of forest land in Ohio, while in 1884 there were only 4,326,641, or less than one-third as many acres.

THE New York, Lake Erie & Western road is about to build 20 new passenger engines, to burn hard coal. The Susquehanna shops of the company are to build five consolidation freight locomotives for use on the leased New York, Pennsylvania & Ohio road.

SOME fast running was made on the Little Miami road, August 25. From Cincinnati to Xenia, 65 miles, in 72 minutes and from Xenia to Columbus, 55 miles, in 56 minutes. On some portions of the run a speed of 83 miles per hour was attained. Pat Golden was engineer and Joseph Kelly fireman of the train.

ON the Austrian railways they are experimenting with a signal torpedo that can be sent back 300 yards by the pressure of air in a bag which the torpedo carries along. If this invention proves practicable, its use would be a great benefit on the American railroads, where the brakeman generally fails to go back with a signal when a train is stalled on the main track.

THE shops of the Chicago & Grand Trunk Railway, at Ft. Gratiot, are very busy with freight car repairs. The company have four new passenger cars partly finished, and have recently bought four cars of the same kind from a contract shop. They are also applying the Aikman automatic coupler to their freight cars, and speak very favorably of its performance and durability.

THE Chicago & Northwestern Railway have recently completed the building of a new roundhouse of 21 stalls, at Winona. The house is 66½ feet between circle walls, and 51½ feet between outside of inside wall and the turntable. The house is heated by steam, and a circular tunnel is built up under the floor which holds all the piping for water, steam and gas.

WE are informed that since the recent brake trials at Burlington, 1,000 Colorado Midland cars have been equipped with the Westinghouse freight brake, and that the New York, Lake Erie & Western has begun the equipment of a large number of its cars with the same brake, orders for 400 sets having been given quite recently.

THE Burton Stock Car Co., of Boston, have made arrangements for the introduction of their cars upon European railroads to take the place of the inferior cars now in use there for the transportation of cattle. It is said that it is the practice in Europe to carry live stock in common box cars, open at the top, and poorly adapted for the protection of the animals while in transitu.

PARTIES interested in the railroad branch of the Young Men's Christian Association are trying to get permission from the Chicago, Burlington & Quincy Railroad officers to use a room in the railroad offices at Galesburg, Ill., for meeting purposes. A petition signed by 300 of the railroad employés has been sent in, asking for the privilege. This society is doing a great deal of good among railroad men in the west.

THE mechanical department of the Grand Trunk Railway are putting under-hung driving springs on their locomotives as they go into the shops for heavy repairs. The reasons given for this change are, that the plan admits of the use of a longer spring with greater width of plate, and their experience is that engines ride easier after the change. The necessity for off-sets in equalizers is also avoided, an arrangement that leads to twisting of springs and their connections.

AN I-beam guide that was put up in the Altoona shops of the Pennsylvania Railroad some time ago, as carrier for a traveling crane, was rather remarkable as an exactly executed piece of rough mechanical work. The guide was 353 feet long and was put up mostly in 24 feet sections. Careful measurements made after the work was finished showed the work to be straight and level except ⅛ inch sag in the middle. The work was done under the supervision of Mr. Amos C. Davis, machine shop foreman.

SINCE the Chicago, Burlington & Quincy road got busy with freight handling this season, they have been running their freight trains equipped with the air brake just as fast as the locomotives could take them along, and the work is done safer than with hand-braked trains running fifteen miles an hour. An officer of the road, touching on this subject lately, mentioned that a stock train left Ottumwa two or three minutes ahead of a passenger train he was traveling with, and arrived at Burlington, 75 miles distant, half an hour before the passenger train. To do this, the train had to be run between 35 and 40 miles an hour.

THE Wabash, St. Louis & Pacific road has turned out at its Toledo shops two very handsome chair cars. The wood-work is of mahogany, very finely finished, with polished brass trimmings. The reclining chairs have a number of improvements and are very handsomely upholstered. At one end of the car is a small smoking room and men's toilet, and at the other end a ladies' toilet and a new style of heater. The cars run on 12 steel-tired wheels. Frank Howard is general foreman of the shops which produced these handsome specimens of car construction.

NOT infrequently, says the *American Machinist*, readers of technical papers or books complain that articles are written in a style rather above their comprehension. It is a question if this is not sometimes a merit. If a reader is interested in the subject he will be very likely to study those parts that he does not comprehend until he understands them, and in doing this he will learn something he did not know before. Technical writers, however plain they may write, can hardly help using terms not understood by those unacquainted with the subject. This is sometimes valuable in pointing out a reader's deficiency.

THE shops of the Great Western division of the Grand Trunk, in Hamilton, Ont., are now building some heavy passenger engines. The engines have 6-foot drivers, and 19 × 24-inch cylinders. In order to give proper support to the piston, and prevent it dragging on the bottom of the cylinder, the piston rod is prolonged through the front cover, and, therefore, supported at each end by suitable bushes and glands. This device is used in many large marine and stationary engines, but is on locomotives the revival of an old practice which was used on some eastern roads twenty-five or thirty years ago. It is now often used in Germany and France. The result of the experiment on the Great Western will be awaited with considerable interest.

MR. P. NOLAN, roadmaster of the Alabama & Great Southern road, at Birmingham, Ala., has invented and patented a new switch which leaves the main line track continuous, the rails on the main line being spiked fast on the switch, as on the other portions of the line. When not thrown by the siding no portion of the switch touches the main line, thus increasing the life of the switch very greatly. It is claimed that while the ordinary split rail switch costs about $55, the Nolan switch can be furnished for $30. Its peculiar features are a raised rail on one side and a split rail on the other, both coming in use only when set by the siding. The switch has been in operation in the yard at Birmingham for five months, and it is said has never failed to work, nor has there ever been a wheel thrown off the track by its use.

THE report of the manager of the Daft Electric Light Co. of Baltimore states that from September, 1884, to May 20, 1885, using three cars with horses, a total number of 158,684 passengers was carried at a cost per passenger of 3.01 cents. From September, 1885, to May 20, 1886, that is, during the corresponding period twelve months later, working two cars with Daft electro-motors at a speed almost double that when two horses were used, the total number of passengers carried was 188,591, at a cost per passenger of 1.66 cents. The total cost per day was $12, as against $18 a day for the horse. The length of road is nearly two miles, or more exactly 10,080 feet. The total weight of the train with fifty passengers is about 17,250 pounds; the usual service of the motors is about 73 miles a day.

AT the ferry of the Columbia river, in Oregon, the Northern Pacific Railroad has one of the finest ferry-boats that ever was built. It takes on board twelve of the longest passenger cars and two locomotives. It is run by double engines, with cylinders 36 inches by 9 feet stroke, one at each side of the boat and acting independently. There is a dining house on board the boat, and the passengers generally eat while crossing the river. That is, those who have never been there before take a meal in the eating place. Persons who have eaten in the place once, generally prefer going hungry to facing the meal provided there. It is the only eating place on the Northern Pacific not managed by the dining car service, and is generally understood as being used as a "shocking example," to show what travelers would be compelled to endure but for the commissariat service attached to the road. A party of hungry travelers were near committing justifiable homicide on Mr. Thomas, general fuel agent of the Northern Pacific, who got off the cruel joke of making them believe that they would get a sumptuous feast by dining on the boat. He will never venture on that hazardous joke again.

IN some locomotives that he has designed for heavy passenger service, Mr. R. H. Soule has made the eccentric throw 6 inches. He thinks the disadvantages connected with the long valve travel will be more than compensated for by the prompt and wide opening which the valve will have when cutting off short. We believe that American locomotive designers have, as a rule, made the valve travel too short, principally because most of the locomotives are used in freight service, where there is no difficulty in getting the steam fast enough into the cylinders at the speeds of piston which have been common in the past. There is no longer the necessity for designing locomotives so that they will be equally suitable for passenger and freight, and we expect now to see more attention paid to the details that contribute to make an engine economical and efficient on one kind of work. The next improvement we look for is larger exhaust ports and more ample emission passages through the saddle. The day is coming when all locomotives shall have long exhaust pipes ending in a single nozzle. Large exhaust passages are necessary to prevent back pressure in the cylinders where a single nozzle is used.

OUR attention has recently been called to a newly designed freight car truck, the invention of Messrs. Susemihl & Jewett, of Boston, and so far as a judgment can be formed as to its merits from an inspection of a large and well-constructed model, it combines the elements of strength, lightness, durability and cheapness to an extent that railroad men will be apt to appreciate. It is designed to take the place of the ordinary diamond truck. The bolster is made of two pieces of ¼-inch steel and has a swing motion, but if desired it can be made rigid by a simple and effective device which prevents lateral movement without removing the hangers. The chief peculiarity of the construction is in the use of side trusses made of 1¼-inch round iron in the form of a link, which is bent to take the place of the inverted arch-bar and is the main support of the bolster. The upper bar is ¾" × 2½" iron and the tie-bar ¼" × 2½". The fastenings of the link truss over the journal boxes are such as to obviate any shearing strain on the bolts. The weight of metal in the truck frame is only about 200 pounds. Care has been taken to adjust the parts so they can be taken out for repairing or renewal with the utmost facility. The details of the construction cannot, of course, be shown without the aid of drawings, nor even then except imperfectly. It is the intention of the inventors to have the truck tested in regular service at an early day.

MR. JAMES MCCREA, General Manager of the Pennsylvania Co., is reported by a Pittsburgh paper as saying: "The freight traffic, as well as the passenger traffic, is immense now. We have ordered and now have in course of construction 6,000 new freight cars. The capacity of our

own shops in Allegheny, Ft. Wayne and Chicago is utterly inadequate to supply the demand in time, and we have placed orders in every car-building establishment in the country not already overcrowded with orders. All the car manufacturers are behind with their orders. It is not alone the Pennsylvania Company lines that are snort of cars. Nearly every railroad in the country finds itself in the same position. You know the Pittsburgh & Western is having 1,000 new cars built, and all the western roads are hampered for want of cars. No, I cannot say that there is any especial boom in business. Ordinarily, except in the way of passenger traffic in excursions, railroad business ought to be dull at this season of the year. Instead of that, it is brisk—too brisk for us. This country is growing, and growing very rapidly. That's the only way I can account for it. Why, look at that train there," and Mr. McCrea pointed to the Cincinnati train on the Pan Handle road, about ready to start out. "You see there are fifteen passenger coaches on that train, including the seven sleepers. That's a big load for one engine to haul, but it is nothing unusual this season. The fact is, we are getting used to big business, and we have found that it is not a spurt at all, but something that is likely to continue."

WHEN an American first enters an English railway coach he is pretty sure to decide that it is much less comfortable than the cars of his own country, and to wonder why our pattern is not adopted. He is put into a first-class compartment, a small space athwart the vehicle, with three seats on each side; and at each end a space which resembles as much as anything the padded cell of an aristocratic lunatic asylum. The roof is low, and he looks along it in vain for the glass ventilators, the glittering silver lamps and the frescoed embellishment to which he is accustomed. The decorations are of the simplest character, usually polished woods, and the luxuriously cushioned seats are covered with plain cloth of a somber color—dark blue, or drab, or green. He certainly cannot find fault with the cushions, they are so deep and plant, and perhaps he thinks the omission of the exuberant frescoing of the American car is not wholly lamentable. Most irksome to him is the unsociable confinement and the narrowness of the bounds. The chances are that though there are seats for six he only has one or two fellow passengers, or he may have all the compartment to himself. If there are others with him they are also sure to hold their peace and crush any conversational overtures with a distant and smileless nod. Each of them has hoped to be alone. In the American train one belongs to the community, and feels no great change between existence in it and existence elsewhere. But in the English train it is impossible to forget that we are traveling, and that travel is attended by many restrictions.—*Ex.*

Union Pacific School Car.

The Union Pacific Railroad Company have got out a school car for the instruction of train men in the handling of the air brake and other train mechanism, that appears to be attracting considerable attention among Western railroad men. The apparatus is fitted up in a car used exclusively for the purpose. There is an upright boiler in the corner of the car for supplying steam to the air pump, which is secured beside the boiler. A stand is fitted up with engineer's valve and triple valve with an exposed section of each that operates when the working valve is used. The fittings are set up for working the brakes on thirty cars, and wheels with the brake shoes applied show the action of every detail of the brake. The instruction to the men is given by the air brake inspector of the road, and he question every man closely, to find out how far he comprehends the mechanism of the brake. There are means provided for dividing the brake connections to represent the action that follows a train breaking in two. When this is done, the instructor explains to the men the proper way to act when an accident of that kind happens. The general officers of the road take a warm interest in the car and in the work being done to enlighten the trainmen on a subject that can not be too clearly understood.

Forty-Ton Ore Cars.

A Cleveland paper describes some ore cars that have recently been built at the Allegheny shops of the Pennsylvania Co. as follows: "The car has three Findlay & Conger center support trucks, two axles to the truck, and the side bearings have a number of small iron balls laid in a slot so that the great weight may move with as little friction as possible. The body is made extremely rigid by a system of double and counter bracing, and the floor, instead of being flat, slopes sharply from the center to the sides, practically dividing the car into two compartments. Each of these is in turn partitioned into five spaces, making the compartments each capable of holding 8,000 lbs. of ore. Along the dividing ridge runs an iron shaft which is connected by chains with doors that swing outward from the end of each space. A large wheel at the end of the shaft enables one man, in a few minutes, to unload the entire car. On account of the extreme width of the cars the Pennsylvania road refused to allow them east of Pittsburgh, but the orders were not issued until two had made the trip to Johnstown, Pa."

Rambles on British Railways.

[EDITORIAL CORRESPONDENCE.]

In the course of my rambles among British railways I had occasion to ask for information from a good many railway officers, and I wish to testify to the uniform courtesy and kindness received on all hands. It is not customary to permit strangers to ride on the locomotives, but Mr. Drummond, locomotive superintendent of the Caledonian Railway, and Mr. Webb, locomotive superintendent of the London & North Western railway, readily gave me permission to ride on the engines belonging to their roads, and I have every reason to believe that similar courtesies could have been obtained from any locomotive superintendent in the United Kingdom.

Riding on a locomotive gives one a good opportunity for observing the methods, restrictions and details of train operating, and many of my notes were taken from that stand-point. Another good way of gleaning information I found to be that of standing round a junction where a great many trains were passing and branching off.

SYSTEMS OF RAILWAY SIGNALS.

Naturally all my comparisons were with American practice. To one who had been for years accustomed to getting trains over western roads, where a signal would not be seen from the beginning to the end of a division, and where other roads crossed at grade were passed safely only by care and vigilant watching to see that cross trains were not approaching, the signal service in use on all British railways appears elaborate and intricate. In some respects the block system by which the movement of trains is regulated looks like an expensive luxury. The system is as near perfection as any product of human ingenuity, and it makes collisions next to impossible; but the expense of operating is enormous. On the crowded lines it is right that each train should be alloted a space of track from which all others should be rigidly excluded, but where traffic is so light that there are normally considerable intervals of space and time between trains, it seems a hardship for railway companies to maintain an expensive block signaling system.

There have been great improvements, or rather elaborations, of the signal system introduced on many British railways since I was running on the Scottish North Eastern section of the Caledonian Railway twenty years ago. The signal system in use there at that time would to-day be considered elaborate on most American roads; yet it was merely the beginning of the perfected system now almost universally adopted. Every station or stopping place had a station semaphore signal with arms and lights for the protection of trains standing on either track, and about half a mile distant from the station on each side, were distant signals operated from the station and used to give approaching trains timely warning of the main line being obstructed at the station. When any train, regular or wild, passenger or goods, got within the protection of station signals, the train men felt assured that their charges were secure from being run into. An engine driver who attended closely to his business, knew every signal and where it could first be seen, and was continually on the watch for them. His eyes were not on the track but in the air searching for signals. That is the leading distinction yet between the British engine driver and the American engineer. To get his train safely along the eyes of the latter are never off the track; the eyes of the former are directed to the point where the next signal is likely to appear.

Trains were moved in the early days in what is now regarded as a reckless, free and easy fashion. There were, first, the time-table trains, which were supposed to keep their own time, but it was left to the discretion of each station master, when trains were irregular, how much margin a slow train should have in leaving ahead of a fast train, and the same agent had to devise means of dealing with every other unforseen contingency that happened to trains. The station agent there was the responsible party for moving trains safely when they got off their schedule time. When an extra train was needed it was generally signaled by a preceding train carrying a green flag, but trains were often run without any signal. The only danger that wild, unsignaled trains encountered was from the practice of trackmen changing rails without protecting themselves by flag, a practice that seems common to the whole railroad world, savage penalties notwithstanding. I was familiar with the working of the division referred to under the system outlined for about fifteen years, and I do not remember of any serious accident happening from trains coming together. There was certainly no collision during that time that caused loss of life.

Between Perth and Aberdeen, the termini of the division, a distance of 90 miles, there were in my time 26 stations. At these, about ten men were employed for the special purpose of attending signals, and all the other signals were operated by men who were needed at the stations had there been no signals.

This division is now operated on the absolute block system, and is divided up into 46 sections which are controlled by men handling the signals in 47 boxes or towers. In 43 of these signal stations there is a man always on duty, so that it takes at least 86 men for the double shift, besides four more men at the day stations. These men can attend to no other duties.

I failed to ascertain the exact number of trains each way that the signaling system has to protect; but an official time table several years old, in my possession, shows that eight passenger trains and nineteen goods trains passed an important junction each way daily. That is a good many regular trains, but we know American railroads where as many are handled daily without any station signals. The block system is a beautiful arrangement, and very efficient for preventing accidents, but a large traffic is needed to make it pay.

The sections or blocks are generally the spaces between stations, but every junction and point where trains are frequently required to stop is made the division of a section. In the signal box at the end of each block there are levers that operate the station signals, the distant signals, and all the switches that connect with the main line. These switches interlock with the signals and cannot be opened till the signals are placed at danger.

All the signal boxes on a road are connected with each other by electricity and the trains are moved from block to block according to a distinctly understood code of rules. Very ingeniously devised instruments operated by electricity are the means of intercourse between the sections. In each box are two miniature semaphores, one for the up line, the other for the down line. Each of these semaphores has two arms, one painted red, the other white. The red arm is used for recording the signal last received and the white arm the signal last sent. Suppose the letters

A B C

represent boxes controlling their respective blocks. When a train is ready to leave A the signalman at A sends to B the "be ready" signal, which also distinguishes the kind of train coming. If the line is unobstructed, the signalman at B returns "line clear." The train is then permitted to proceed to station B. Meantime, the signalman at B notifies C to be ready, and by this means the trains are passed from block to block without delay. As soon as the train enters the block at A the danger signal is raised and remains at danger till the signalman at B notifies the man in A box that the train has passed off the block.

Another system used to some extent is the permissive block system, by which more than one train is permitted under certain restrictions to be in a block at once. This system is under the ban of the Board of Trade officers, who have whatever charge of railways the government exercises, and it is falling into desuetude.

METHODS OF OPERATING SINGLE TRACK.

There is a savage antipathy among the British public and among railway men to single track lines, and consequently there are few of them in operation. Those in use are operated in a way that looks full of tiresome restrictions and needless complications to one who has been accustomed to American single track operating. As there is no train despatching system in Britain, where a corps of men accustomed to the business attend to the moving of trains, very crude methods have been followed when accidents required a portion of a road to be operated by single track, and accidents have been so numerous on even short sections of single track, that an impression was given that operating in such a way was very dangerous. In my time a man with a red jacket rode on the engine of every train that passed over a piece of single track, and the engine driver was not, as a rule, permitted to start without that man being on the engine. But when it was necessary to move more than one train in the same direction before a return train came, there was an arrangement that permitted trains to go without the red jacket. By misunderstanding of the rule applying to this arrangement, several bad accidents occurred, in one of which a driver I was firing for got his leg broken, but I luckily happened to be absent that day.

The red-jacket way of operating single track has now developed into what is known as the "train staff and ticket" system. To operate under this system, a road has to be divided up into sections as is done for the block system. Suppose the road is divided thus:

A B C D E F

The section between each pair of letters has a staff belonging to it, which is easily distiguished from the staffs belonging to other sections, and the original idea was that no engine driver should leave a station to go upon a section without having the train staff belonging to it in his possession. If this rule were strictly adhered to, of course there would be no accidents from two trains meeting each other between stations; but as traffic tends to run all in one direction at certain times, the staff could not be used on every train without sending it often back by special engine. To prevent this expense and delay a ticket arrangement was added to the staff. That is, each staff has certain tickets belonging to it, which can be used as authority for running over a section. Should the station agent at A be aware that he would have three or four trains going to B before any others came back, he would give the driver of each train except the last one a ticket. The last train carries the staff. A driver cannot leave a station on the authority of a ticket without being shown the staff. As the staff must be at the station from which trains are moving till it accompanies the last one, the fact of showing it each time a train is started is a safeguard against mistakes.

On portions of the Caledonian Railway where the staff and ticket system is used in operating branches, the

tickets are locked in a box which can be opened only by a key fastened to the staff. This prevents a station agent from giving a ticket unless the staff is in his possession.

To put down the elaborate machinery required for a block system every mile or two, to keep it in working order and to pay the men necessary to operate it, adds materially to the working expenses of a railway. Railway directors in Britain did not invest in this expensive system till the force of public opinion or crowded tracks forced it upon them. The British train service had two weak points that tended to render a block system necessary, before the number of trains became what an American superintendent would regard as difficult to handle. As has been said, there is no train despatching system, and the lack of a skilled head watching over train movements, ready to provide for departures from the schedule arrangements, was apt to permit confusion whenever anything happened to upset the regular run of business. But the great weakness of the British train has always been want of good brakes. Nearly all passenger trains are now equipped with a continuous brake of some kind; but this was not the case when the demand for a block system began to be strongly urged. The British train arrangements do not permit a brakeman to pass from car to car applying brakes when the necessity for stopping suddenly arises Before the continuous brake was applied to passenger cars, the train braking was done by a brake on the tender and brakes on two guards' vans that were generally on the train. When these brakes were applied nothing more could be done to hasten a stop except to reverse the engine and apply sand. That meant that a heavy train needed a great deal of room to stop from a high speed.

The goods trains now run on every British railway are controlled in a looser way than passenger trains were before the continuous brake was introduced. With the ordinary freight train the braking is done by the tender and one van at the end of the train. The newer types of goods engines are now getting driver brakes as an auxiliary means of controlling the train. Should a goods train run away going down a hill, the train men must wait passively till the level is reached, for they cannot apply more brakes, as the ordinary freight car has merely a lever brake that can be applied only from the ground, and the loose couplings used makes passing over a train in motion a dangerous feat. There appears to be no movement leading to the adoption of continuous freight car brakes in Britain, so while the trains must be provided with a long space for stopping, an elaborate signaling system is an absolute necessity. We are away behind Britain in the signal service, but we are ahead on brakes. The question so much agitated lately, of why British railways are more expensive to operate than those of America, is easily answered.

A. S.

Shop and Engineering Notes.

LEHIGH VALLEY SHOPS AT WILKES-BARRE.

There are few railroad shops to be found where a mechanical man can spend a half-day more profitably than in the Lehigh Valley shops, at Wilkes-Barre; for Mr. Alexander Mitchell, who is superintendent in charge, may always be depended upon to have some improvements in hand that will be interesting to examine. As is well known, Mr. Mitchell is the inventor of the consolidation locomotive, and it is generally acknowledged that no living engineer has done more to increase the efficiency of the locomotive as a heavy freight motor.

The most interesting work to be seen in the shops at present is an engine Mr. Mitchell is building according to the Strong designs. Although Mr. G. S. Strong is the patentee of many of the locomotive improvements being put into service by Mr. Mitchell, the latter gentleman's practical knowledge and excellent mechanical discernment exercise a potent influence on the details of construction. The leading novelty about the locomotive now in course of construction is, that the furnace is formed from two corrugated flues similar to the Fox furnaces so much used in marine boilers. The flues are set side by side and are joined in front, forming what must be very strong fire apartments, besides providing an unusual area of heating surface exposed to the direct heat of the fires. Between the front connection of the furnaces and the tube sheet is an ample combustion chamber. The operations of joining the furnaces together and connecting them with the shell of the boiler gave opportunities for some of the finest pieces of boiler-making work we have ever examined, and reflect the greatest credit on the designers and upon the mechanics who did the work. This form of furnace dispenses with the necessity for the stay-bolts essential to strengthen the flat surfaces generally used with locomotive fire-boxes; yet the flue furnaces are so strong that 160 pounds of steam can be carried on the boiler with a safety margin of five. There will be 62 square feet of grate area and about 1,800 square feet of heating surface in the boiler. The object of building this form of boiler is the desire to make a strong, durable boiler and furnace where anthracite or bituminous coal-dust can be burned when the engine is pulling heavy trains. The eminent success of the Fox furnace in marine boiler service leads us to believe that Mr. Mitchell has produced a locomotive boiler of this form that will prove durable and safe, while possessing the qualities necessary for the economical consumption of inferior coal.

The valve motion of this engine is of the radial type, taken from the ellipse formed by the fulcrumed rod of a single eccentric strap. The movement for the exhaust valve is taken from the eccentric rod at a point near the strap. The motion that was tried on engine No. 383, where the main rod carried the connections that operated the valves, as in the Joy motion, did not prove satisfactory, and had to be abandoned Mr. Mitchell does not think a valve motion can be made to work accurately or safely on a high-speed locomotive where the parts are swung round on a main rod, and there is good reason for believing that his experience is sufficient to make him very good authority on the subject. The steam chest and valve arrangement are substantially the same as are illustrated in the NATIONAL CAR-BUILDER for last year on page 135.

There are five other engines in the repair shops, most of them getting heavy work done.

DELAWARE, LACKAWANNA & WESTERN SHOPS, AT SCRANTON, PA.

Some months ago, Mr. Charles Graham, who had been previously in charge of the shops at Kingston, took charge here. Mr. Graham is celebrated as one of the ablest mechanics in Pennsylvania, and, like most capable men, he likes to see cleanliness and neatness pervading the establishment he presides over. The shops at Scranton were a good subject for a man of that taste to operate on, and already a great improvement has taken place in their appearance. Many ancient strata of grease and grit have disappeared from buildings and machinery, and it is possible now to tell the condition of the engines by looking at them. Mark Twain noted during his travels in Italy, that the coating of dirt usually worn by the natives was jealously protected against soap, water and other enemies to filth; but he also observed that this clinging to the comforts of dirt had its disadvantages, for when the cholera came along and seized hold of a victim the latter was dead before the doctor could dig through the dirt to find out what was the matter. Railway machinery can work along for a time covered with dirt and grit, but in the end it often fares like the soap-hating Italians. The superincumbent coat of dirt hides a fatal disease, and disaster comes because there was no means of detecting the growing malady. For this reason, apart from other demoralizing influences that dirt brings, we do not think railroad companies can afford to run their machinery on what might be termed the dirty plan.

The shops belonging to the various divisions of the Delaware, Lackawanna & Western Railroad are run on the plan of each being a law unto itself in regard to the work turned out and the methods of doing it; but the Scranton shops are the largest belonging to the system, and here material is prepared and parts produced for use in the smaller shops. They also do a good deal of work on machinery connected with the mines belonging to the company, and at present they have several small engines and pumps in course of construction for this department.

There are twelve locomotives in the shops, most of them getting heavy boiler repairs, the excessively bad water used on the divisions around Scranton making the boiler repairs abnormally heavy. On Mr. Graham's desk may be seen a paper weight 1½ inch thick, made out of a piece of scale taken off the fire-box of a locomotive that had been running on the Bloomsburg division. Unfortunately, the material for making this novel kind of paper weight is too plentiful round here. The specimen on Mr. Graham's desk is polished, and the successive layers that went to build up the miniature rock can be discerned as clearly under the microscope as the greater layers traced by the geologist as making up sandstone formations.

When a freight engine with an ordinary oblong fire-box comes in with the latter so badly worn as to need renewal, Mr. Graham replaces it with a wide fire box resembling the Wootten, but having no combustion chamber. Boxes of this kind were used twenty-five years ago for burning anthracite coal, and they were perfectly satisfactory as furnaces; but all the driving wheels were placed in front of the fire-box, and the latter was so heavy overhanging the wheel base that it made the engines pitch while running and ride terribly hard, and in some instances raised the front end from the rails. For that bad feature alone it was abandoned, the engineers of that generation not thinking it practicable to raise the fire-box above the wheels. Mr. Graham puts in a cast-iron bolster above the cylinder saddle, thick enough to raise the front end to the required height, and raises the fire-box far enough to clear the back driving wheels. This kind of fire-box is said to be easier made and less trouble to keep in repair than the Wootten fire-box, but whether it will be as efficient without the combustion chamber is an unsettled question.

Mr. Graham believes that breakages of engine machinery are almost always preceded by indications in the form of cracks that give warning that removal is necessary. He makes very diligent and systematic search for the flaws that indicate growing weakness in rods, axles and other parts subject to severe shocks and heavy strains. A careful inspector examines these parts by the aid of a magnifying glass. When the scratch is seen that may be the outside of a crack, the place is carefully wiped and then moistened with kerosene. If the suspicious feature is found in a rod, the rod is placed on two trestles with the part under examination facing downward, and the rod is struck a sharp blow with a hammer. If there is a flaw the blow always imprints a black mark on the fresh kerosene. When an axle is under examination, it is placed in the wheel hydraulic press and pressed on the ends. This brings out the black hair-like mark on the kerosene if the axle is cracked.

One engine in the shop came in with a broken driving axle. The axle was iron, 7½ inches diameter, and it was replaced by one 8 inches diameter.

Much trouble had been experienced with eccentric straps breaking. As in most similar cases, bad form was the cause, the strap having been a plain band, with projections for bolt lugs and rod neck. By putting part of the material into a fin, greater strength was obtained with the same amount of material. A larger oil cellar was made on the top, and it was connected by a groove with the bottom cellar, which caught the superfluous oil passed from above These small changes ended the annoyance, expense and delay from broken eccentric straps.

The driving-wheels cast for this company have several cuts through the rim, closed up with a piece of wrought iron, one of the cuts passing through the counterbalance block. This, of course, is done to avoid the local strains on the spokes due to the cooling of a solid rimmed wheel. Mr. Graham says it effectually prevents the breakage of spokes.

When valve stems get warm, Mr. Graham follows the practice of covering them with copper tubing, and finds that the copper wears longer than steel.

DICKSON LOCOMOTIVE WORKS.

In the course of a pleasant visit to the Dickson Locomotive Works, at Scranton, we learned from Mr. Devine, the superintendent, that they were fairly busy, although not working up to more than half the capacity of the works. They are building 15 locomotives for an Arkansas road and 10 for the Delaware, Lackawanna & Western. There is one small engine recently finished for hauling material around iron works, and another of the locomotives built by this company for doing the shifting work at the ends of the Brooklyn Bridge.

In the works there is a locomotive belonging to the Pennsylvania Railroad which had the crown of the Wootten fire-box burned. The water had been permitted to fall beneath the crown sheet, and the whole of the latter bagged down, the middle part being about 12 inches below its former position. The sheet was forced away from the stay-bolt heads, but no fracture took place. The outer shell of the fire-box was drawn downward several inches. The fire-box was ruined and will have to be renewed. No one was injured by the accident that di-abled the engine.

They are turning out a good many Boise steel wheels from these works, and they receive very favorable reports of their performance. We observed that this wheel was used under the engine trucks and tenders of several of the engines newly built. We understand that the proprietors of the wheel have arranged to manufacture it with special machinery designed and built for the purpose.

They are very busy in the boiler shop of the Dickson Works, and some very large boilers are being made for mining and manufacturing purposes. A fine large boiler is nearly completed, designed by Mr. E. D. Leavitt, for the Calumet & Hecla mines, Michigan. The boiler is of the locomotive type, with a shell 90 inches diameter made of $\frac{7}{8}$ steel, capable of standing a working pressure of 120 pounds to the square inch. The seams are of a form of lap-joint which shows 93 per cent. of the strength of the solid sheet.

This boiler shop is particularly well supplied with machinery for operating on and handling heavy boilers. Th re are two Tweddell hydraulic riveting machines, which do their work admirably. We stood round for some time watching the riveting done by one of these machines. The men worked very leisurely, apparently, and made an excellent job, yet they did their work at the rate of two rivets a minute.

ERIE MECHANICAL DEPARTMENT.

Travelers familiar with the New York, Lake Erie & Western Railroad are getting the fact forced upon their attention that considerable house-cleaning has been going on for several months past. Ever since Mr. King took the position of president, he has exhibited an inclination to rattle up the dry bones of the old Erie, and he is surrounding himself with officers who seem determined to infuse new life where a spark of vitality remains, and to bury out of sight the hopelessly dead. The habits, methods, prejudices and practices of the venerable Erie Railway had been unchangeable so long that people connected with the company had come to look upon radical changes as impossible. New presidents, new general managers, new superintendents might arise and begin handling a broom that was new, but their work of sweeping encountered so much that was old and seemingly time-honored, that the besom of reform was incontinently dropped, and Old Erie's ways went on, seemingly, forever. What was fondly deemed unchangeable has now changed, however.

In Mr. R. H. Soule, Mr. King has got a superintendent of motive power who is going through his work of reform thoroughly and fearlessly. We do not envy him the pleasure to be obtained from performing the duties he has undertaken, for no reformer may expect to escape hatred,

contumely, abuse and misrepresentation; and how far these are likely to be encountered in the present case only those know who have undertaken to change established usages among railroad men. There are many roads in the country still being run to suit the dictation of the employés, and wherever this condition of things exists, the operating is done loosely and at great expense. Until the present management took hold, the Erie never has been run on business principles; and it is not to be wondered at that there is now a vast amount of what train-men call "kicking."

During a recent trip over a portion of the road we heard a great deal about the changes effected, and noticed considerable improvements at stations and on the rolling stock. The numerous car bodies, which were used at so many places from time immemorial as storehouses and shelter places, have all been cleaned up, and neat houses substituted where a house was necessary. It is said that the iron saved from the old cars was alone sufficient to pay the expense of putting up the houses.

For years there have been a great many old cars of the most decrepit character retained as property of the company, although a loaded journey generally entailed as much expense for repairs to each individual car of this kind as the freight charges amounted to. Some 1,500 cars were broken up last year because they had got beyond the condition of economical repair, and the work still goes on; so that the cars kept in service solely on the claim that they have done good work in their time, will soon disappear. Numerous other rolling stock antiquities are passing away, and the regenerating influence of the forge and cupola is being exerted upon many an ancient appliance that escaped the scrap heap long after the period of its usefulness had passed.

The policy now followed by the management is to concentrate the work of building and repairs in the shops best adapted for doing the work well and cheaply. This policy is obstructed to some extent by the towns likely to lose the men employed where small shops are located. In some instances city authorities are perfectly justified in objecting to the removal of railroad repair shops, for they have been located originally in return for the grant of valuable franchises. Vested rights of this kind have been recognised and respected, and they will to some extent interfere with the centralization plans; but there is room for great improvement where no legal obstacles intervene.

Whenever renewals of rolling stock are made or important repairs effected, standard forms are produced. Very strict attention is being devoted to bringing about uniformity. All cars and locomotives have been arranged into the types best suited for the work done by the road, and in a few years the standard types alone will be used.

They have recently received from the Baldwin Locomotive Works two passenger mogul engines with Wootten boilers for service on the fast passenger trains over the mountain division. The engines have cylinders 20×24 inches, drivers 68 inches diameter, and the boilers have nearly 1,800 square feet of heating surface. Baldwin's people have also just received an order to build ten consolidation engines with Wootten boilers, the cylinders being 20×24 inches and the driving wheels 50 inches diameter. The Grant Works have received an order for ten bituminous coal-burning consolidation engines, to be used on the New York, Pennsylvania & Ohio system; and the Susquehanna shops have commenced building five engines of the same kind, for the same service. The cylinders and wheels of all the consolidation engines are the same, whether the fuel to be burned be hard or soft coal. A striking feature of all these locomotives is the great area of heating surface of boiler in relation to the cylinder capacity.

CHICAGO & ATLANTIC SHOPS, AT HUNTINGTON, IND.

This road is doing a good business, and expects to do better shortly; so Mr. Johann, the master mechanic, is busy getting the rolling stock into shape for the coming train harvest. Like many other roads where the reputed wisdom of the serpent was not present during the construction period, the Chicago & Atlantic suffers from the effects of bad feed water, and the boiler repairs are high in consequence.

A curious circumstance helped to make the water supply on this road peculiarly bad. While the road was under construction, the contractor employed a gang of well-borers, and engaged to keep them at work steadily. For fear the men should have nothing to do, places where surface water might have been easily obtained were avoided and all the tanks were located beside wells driven through the limestone rocks. The well-diggers were kept busy, and so have been the boiler-makers on the engines using the water.

Mr. Johann is making some changes on the boilers that will enable him to wrestle with the scale and sediment more successfully, and he expects to run engines eighteen months without taking out the flues. He has experienced so much trouble with leakage round the fire doors where a ring was employed, that he is flanging the door opening on all engines that come in for extensive boiler repairs, and he finds that method is much better for bad water. Half side-sheets were put into several fire-boxes, but they gave so much annoyance by leaking at the seams and round the seam rivets that Mr. Johann has concluded that it is cheaper to put in a whole side-sheet when extensive patching can no longer be delayed. The expense of putting in a whole side-sheet is not so much greater than that of putting in a half-sheet, and the thorough method leaves a lasting job. One engine is getting a new fire-box 72 inches long, to replace one of the ordinary size of 66 inches that was worn out. When this engine is again in service, Mr. Johann intends making a series of carefully conducted tests to ascertain the relative value of various popular locomotive appliances.

The switching engines belonging to this road have four pairs of driving wheels connected in front of the fire-box, and a pair of carrying wheels under the foot-plate. The latter pair of wheels carries so little of the weight of the engine that the driving wheels have plenty of weight to prevent slipping, but the small wheels prevent the pitching motion so noticeable in most four wheel switching engines. The small wheels have enough lateral play to prevent binding on curves.

In the car department they have two passenger cars getting a general repair and one receiving light repairs. They have adopted white as a color for their freight cabooses, because a white object is most readily seen in the dark or dusk. Mr. Johann claims that white can be kept clean as easily as red.

CHICAGO & NORTHWESTERN CAR SOHPS.

During a recent visit to these fine shops, at West Chicago, we found Mr. Schroyder, the master car-builder, quite busy with repair work. Four new combination cars were in the paint shop undergoing the finishing touches. These cars are plainly finished in oak and walnut, with leather upholstering. They are notable for the simplicity of the parts, there being only three pieces between the windows and ceiling. They have the company's standard heaters, with air pipes passing throughout the car. The roof is made with gutters along the sides from whence the water can escape by tubes that carry it clear of the deck screens.

The car department is at present engaged in renumbering the cars belonging to the road, so that no two cars shall bear the same number, be they passenger or freight.

They have under way, or are getting out material for, 10 new way cars, 10 box cars, 14 stock cars and 2 milk cars. The principal work going on is confined to the repair of freight cars.

Where new trucks are being put together, Mr. Schroyder has arranged blocks on the rails to keep the wheels square and at the proper distance apart. If the truck parts will not go together when the wheels are in this position, it will indicate that some of the dimensions are wrong.

As an illustration of how ready workmen, even of the humblest kind, are to invent improvements, we were here shown a well worked out device got up by an old Norwegian, who is working at car repairing, the object of the invention being to prevent the draw-bar from chafing the draft timbers.

The company has lately erected Howe scales between the machine shop and car shops, 52½ feet long, and capable of weighing a vehicle weighing 120,000 pounds. Although the parts are necessarily heavy in order to handle such weights, the scales weigh a man to one pound.

Mr. Thompson, chief draftsman of these works, is getting out lists of small outline drawings of all the car equipment belonging to the road.

Tests of Steam Jacketed and Compounded Locomotives.

At the summer meeting of the Institution of Mechanical Engineers, held in London, Mr. Alexander Borodin, of Kieff, Russia, read a long and interesting paper, giving the particulars of experiments made by him in the steam jacketing and compounding of locomotives. In the summer of 1880 Mr. Borodin took two locomotives of the same class, compounded one of them and applied a steam jacket to the cylinders of the other, and then subjected both to a series of carefully conducted tests, to ascertain the effect of the changes and the relative value and economy of the engines.

One set of tests were made by taking the locomotive off the track, and using it for running a machine shop, the exhaust steam being condensed, and its quantity and temperature measured, whilst indicator diagrams were taken at stated intervals. When working at reduced power, about 90 indicated horse-power, the utility of the jackets was proved.

The same engines were tested on the road, the speed of the trains being noted as well as the number of revolutions, the boiler pressure, the pressure in the jackets, the conjunction of moist steam, the consumption of fuel (wood) and the quantity of steam condensed in the jackets. Indicator diagrams were also taken. Tests were made with six different positions of reversing lever with the simple engines, and at fourteen different positions with the compound engine. The ordinary locomotive, steam-jacketed, evaporated 3.33 lbs. of water per pound of wood, and the compound engine, steam-jacketed, 3.82 lbs. of water per pound of wood, showing a superiority of 14.6 per cent. in favor of the compound engine. This result is attributed to variation in firing and difference in wood. In one set of experiments with the jacketed compound far more steam was consumed than when the jackets were shut off; a result attributed to absence of circulation or failure to remove water. The following conclusions were arrived at as a result of the trials referred to.

1. With the same expansion of steam the consumption of water and of fuel is less in a compound locomotive than in an ordinary engine.

2. The economy of water and fuel in a compound locomotive, under the same conditions of expansion, is greater according as the range of expansion is higher.

3. With 4.8 fold expansion, the greatest which could be obtained with the ordinary engine, the compound engine gave an economy of 22 per cent. in steam and 32 per cent. in fuel.

Taking as a standard of comparison the work done by an ordinary and a compound locomotive with equal consumption of water and fuel, the following conclusions were arrived at:

1. For the same consumption of water and fuel per hour, the work done by the compound engine is greater than that done by the ordinary engine.

2. For the same boiler pressure and the same speed, the increase of work done by the compound engine compared with ordinary engines diminishes in proportion as the total consumption of fuel and water increases.

3. For an equal consumption of 4,800 lbs. of water per hour (with 141 lbs. boiler pressure, and 85 revolutions per minute), the work done by the compound engine is 19 per cent. greater than that done by the ordinary engine.

4. Under the same conditions and for an equal consumption of 1,570 lbs. of fuel per hour, the work done by the compound engine is 32 per cent. greater than that done by the ordinary engine.

Trials made to test the comparative consumption of water and fuel in compound and ordinary engines doing equal work led to the following conclusions:

1. For doing the same work the compound engine uses less fuel and less water than the ordinary engine.

2. At the same boiler pressure and the same speed, the economy diminishes with the increase of work done.

3. With a pressure of about 136.5 lbs., a mean speed of 85 revolutions per minute, and a total development of 190 horse-power, the compound engine gives an economy compared with the ordinary engine of 19 per cent. in consumption of steam, and of 22 per cent. in the amount of fuel.

In trials made with an ordinary engine, steam jacketed, it was found that with an expansion of 4.8 fold in the first notch an economy of 12 per cent. was obtained by the use of jackets. With an expansion of 1.3 fold the economy from the jackets became negative. With the compound engines the jackets gave "negative results," an "unexpected" phenomenon, which was attributed to the intermediate receiver being placed in the smoke-box, and to the loss of steam in opening and closing the regulator.

Other tests made at another time with ordinary and compound engines, while running, gave the following approximate conclusions:

1. When the jackets are not in use, the compound engine gives in comparison with the ordinary engine an economy of 13 per cent. in consumption of steam, and of 24 per cent. in consumption of wood.

2. Admission of steam into the jackets does not sensibly affect the consumption of steam in the ordinary engine; whilst in the compound engine it produces an injurious effect, and increases the consumption of fuel and water per indicated horse-power.

In summing up the results of his inquiries, the author says that: The steam jackets on the ordinary engine, while working in the testing shed in the first and second notches, undoubtedly gave a mean economy of steam of 16 to 18 per cent. In the experimental trains the jackets did not generally give satisfactory results, except when the ordinary engine was working in the first notch; but this must be attributed partly to the losses of steam necessary for warming up the walls of the jackets each time the throttle was opened, and above all, to the defective drainage of the jackets, which probably transformed them into condensers. A better means of draining the steam jackets must, therefore, be sought for.

The compound system undoubtedly gave an economy of steam and of fuel; the amount of this economy varies sensibly with the conditions under which the engine is working, and in ordinary work it may be taken at from 15 to 20 per cent.

THE Chicago & Northwestern Railway Co. have built 50 new ore cars of a style that in all probability will succeed those now in use. They are nearly 30 feet long, have four wheel trucks, two traps for dumping the ore, and are intended to carry a load of 40,000 pounds.

ALTHOUGH some of the fast through trains that are run on the New York Central Railroad have often twelve or thirteen cars, they are pulled by the ordinary Buchanan locomotive with cylinders 17 × 24 inches, and driving wheels 66 inches diameter. These engines do the work fairly well, and seldom fail to get in on time, but the increase of traffic is so steady that still heavier loads must be handled, and Mr. Buchanan is designing an improved type of locomotive for the service with cylinders 18 × 24 inches, and other parts large in proportion.

MR. GEORGE H. COLBY, Master Mechanic of the Boston & Albany Railroad, died in Boston, Sept. 13.

Economy of Burning off Paint.

The following paper on this subject was read by Mr. Robt. McKeon at the recent convention of the Car Painters' Association:

To the Master Car and Locomotive Painters' Association:

GENTLEMEN: Although not appointed on this subject, yet I feel that it would be a neglect of duty to the company in whose interests I labor, as well as to the members of this association, did I fail to express my views on the question at issue, and therefore propose to take sides with the affirmative in what I shall present for your consideration.

We find that the resolution refers to the cars that are badly cracked. Now, a car that has a heavy body of paint and varnish on it is generally well protected. Although its appearance condemns it, there is a good protection to the sheathing, it is sound and well seasoned, for we rarely find the paint cracking down to the wood; the moisture has been dried out, and our object will be to show the economy there is in burning off the old cracked paint and repainting. We shall speak from a practical standpoint, from actual experience, having painted a large number of baggage and express cars, and never yet stripped them where the sheathing was sound. We claim that the seasoned lumber will hold paint longer than new; it has become hardened, the cells of the wood are filled with the priming of the original painting; the surface on the old covering can be brought up with one coat of paint less than on a new surface. This will save an outlay of $5.15. There is also a saving of $4 on the puttying if the sheathing is nailed on the surface, as most baggage cars are, so as to secure additional strength. Every thing goes to show that removing the sheathing for cracked paint on its surface is wastefulness; it is showing a disregard for economy, and we even claim that if no additional expense was attached to putting on new sheathing, it would be preferable to use the old, for the additional wear the paint would give on the old seasoned wood.

Baggage cars burn off easily, and are left with a good surface, very little dressing being necessary after the burning is done. A sharp steel scraper and No. 2 sandpaper will complete the car, ready for priming, at a cost of $4 after it is burned off. The burning will cost $11, thus preparing the car for painting at an expense of $15; and this burning and cleaning up includes letter belt, doors and posts, which would be done if the car had new sheathing, and will cost $5 to burn off and dress up, thus leaving the actual expense of burning off and dressing up the sheathing ready to paint, $10.

We claim, therefore, that the saving in burning off the cracked paint from the old sheathing in place of putting on new is $37.08, but we will give you an itemized statement of the expense of covering a car anew.

A 50-foot baggage and express car, with double doors, will take about 88 feet of sheathing, running measure, to cover it. White wood and pine are both used, the cost being about the same; this, taken after it leaves the planer, is worth $15.84; to clean it up ready for putting on the car will cost $7.92; the batten for the car ready for putting on costs 60 cents; labor tearing off the old ceiling and putting on the new is $16.92, and the nails required will cost $1. This gives the cost for material and labor putting on the sheathing $42.08, which, with the extra coat of paint to bring up the surface and the puttying, makes the difference in favor of burning off $41.23. There may be a slight variation from these figures, according to the build of the car, but this will give a fair average.

In view of the fact that we have shown you the first saving in the expense, let me establish another claim, and that is: the car that is painted on the old sheathing will wear one-half longer than the car that is painted on the new, that is, so far as the painting is concerned. I have observed this frequently, and a thorough investigation by any unprejudiced painter will convince him of the fact. No one will hesitate to acknowledge that the second painting on a car will give more wear than the first, for the reason that the wood is firmer and there is less expansion and contraction than in the new, fresh finishing lumber.

I will admit that it is all very nice for the painter to have no trouble removing cracked paint, but I think it is our place to economize when we can; it is money for the company to keep the old sheathing on their baggage, mail and express cars (as well as on coaches or any class of car) just so long as it exhibits no signs of decay. It will pay to burn off the paint, if necessary to do it, as long as the wood is sound. Of course if the painted surface is in good condition and free from cracking or scaling, it can be rubbed down and repainted without the burning, as it would be a waste of time and material to remove the sound paint just as much as it would be to tear off the sound sheathing.

A Fast Run with a Heavy Train.

Very fast runs with one or two cars have been very common of late, and there are few roads that have not got locomotives capable of taking light trains over a long stretch of track at a speed bordering on a mile a minute; but to take an ordinary train along at that speed is a notable event. A run recently made on the Chicago & Atlantic Railway with an ordinary train calls for special notice. The train consisted of 6 cars, composed of 1 express, 1 baggage, 2 day coaches, 1 sleeper and 1 officers' car, the whole weighing about 180 tons, exclusive of locomotive. This train was received from the connecting road one hour and thirty minutes late, and it was very important that connection should be made at Chicago, so the engineers were instructed to make up all the time they could safely. The run was made by Brooks eight-wheel engines, with cylinders 17 × 24 inches, driving-wheels 5½ feet diameter, and fire-box 66 inches long, with heating surface of boiler in proportion. The engine weighs 73,000 pounds, and the loaded tender 35,000 pounds. The engine had thus to do the work of moving 234 tons at the velocity noted below. From Marion to Huntington the engine was run by Engineer Boyd; from Huntington to Chicago, by Engineer Penfield. From Marion to Huntington is a distance of 126.7 miles. There are 27 stations or crossings in this part of the way, none of which can be passed without reduction of speed. Dead stops were made at 11 of these places, yet the run was made in 174 minutes. At one place the train stopped 5 minutes. The train dispatcher's sheet shows 2 minutes for each of the other stops. Taking 25 minutes for stops off 174, leaves 149 minutes for running time. When the distance needed to pull up and get into high speed again before and after each stop is considered, it will be seen that the train was run over a mile a minute the greater part of the way.

Six minutes were lost changing engines at Huntington, and the remaining 142.2 miles were passed in 230 minutes, in which 28 stops had to be made and ten more places passed where reduction of speed was necessary. The speed attained between stations varied from 40 to 62 miles per hour. The average speed, including the numerous stops, was 39.4 miles per hour. There was no special preparation made to take the train along at this high speed, and the same thing could be done any day if it were called for.

The Chicago & Atlantic is a fair average of the roads running into Chicago, so far as stopping places are concerned; yet 39 absolute stops had to be made in 269 miles. Throwing away the energy represented by the high speed every time a stop had to be made, and then lifting the train quickly into high velocity again, represented immense loss of power. But it illustrates the difficulty of moving American trains at a high average velocity.

Questions from Locomotive Firemen.

The *Locomotive Fireman's Magazine*, which is a model publication of its class, has been encouraging its readers to use the pages of the journal for discussing subjects that are of practical interest to the men who will be the locomotive engineers of the future. The boys have responded to the invitation, and are calling for light in a hopeful way on subjects connected with engineering. One writer discussing water pumps says:

"It was suggested that it was a wonder that pumps would work as well as they did when the fact was taken into consideration, that at every stroke of the pump-plunger a quantity of water equal to the plunger in bulk is admitted through the receiving valve, then imprisoned between the said valve and forced to lift the discharging and the check valves with the full steam pressure on it and thus find its way into the boiler. The question then arose, what is the pressure against which the water admitted into the boiler through the check has to work? One party contended that the water being forced into the boiler below the water line did not meet with the resistance which it would have to encounter if admitted into the steam space, while on the other hand it was urged that the pressure was equal in all directions in a boiler and that even if the steam did not directly oppose the entrance of the water from the pump yet it pressed downward on the water causing it to transmit its pressure augmented by the weight of the superincumbent water. Which was right?"

In answer to this we would say that the pressure against the pump was the pressure of the steam in the boiler plus the column of water above the check and the height of the check valve.

The same writer continues:

"Recently one of our freight engines with three pairs of drivers, burning hard coal and using double exhaust nozzles, broke a corner off the right slide valve. This piece measured 2 by 2¼ inches on its angle sides and 3 inches across the other side, was scant ⅝-inch thick and weighed ¾ pound. On opening the steam chest it was found that while the corner was broken off entirely it was not in the chest, nor did it appear to be in the steam or exhaust passages, nor was it found in the cylinder. When the left steam chest was uncovered the piece was found over there to the surprise of all hands, having made a very remarkable transit from the right to the left steam chest without doing any damage.

"Can any one give a lucid explanation how this seemingly impossible result was brought about?"

This was a most extraordinary accident, and the only way the piece got transferred from one steam chest to the other was through the exhaust passages. It was, no doubt, thrown from one exhaust opening and fell into the other. For that distance its journey would be simple enough, but the trip from the bottom point of the exhaust pipe to the inside of the steam chest would be made under great difficulties. When the engine is running reversed, there would at times be sufficient suction from the cylinder to draw a piece of iron into the steam chest, but it would have little chance of passing out of the exhaust port without getting caught by the valve. But if the piece got into the steam chest as described, it made a most astonishing journey.

Superstitions of Trainmen.

A newspaper reporter with a fertile imagination has discovered that mail car No. 48, belonging to the Illinois Central Railroad, is haunted, and is environed by a pale of bad luck. Since a clerk died in the car, it has been perturbed by doors flying open without cause, and bolts falling out in spite of the strongest efforts from monkey-wrenches to secure them beyond the loosening influence of jar or ghost, and that even the well-known magic power of an old horseshoe has exercised no potency over the spirits of unrest. When that remedy fails, the car must be in a bad way, at least it will appear so to the trainmen, who, as a class, are as superstitious as sailors.

Men engaged in a hazardous calling are nearly always superstitious. The causes for this are not hard to find. When they meet with so-called bad luck, any preceding incident is apt to be regarded as an omen, and men who work with their lives in their hands have their perceptions quickened for such omens. We were once very forcibly struck with the strong belief some men entertain as to the efficiency of an old horseshoe in preventing accidents. We had a fireman who kept an old horseshoe fastened to the inside of the cab. It was a rough article that was far from being ornamental in appearance, and it struck the fireman one day that a little grinding and polishing would improve its looks. He took it off and began the work of polishing. He had not finished the job when starting time came, and he left the shoe in the roundhouse. We had only got five miles away, when through a mistake in orders we met another train on the same track. We met on a curve, and there was some very lively scrambling among the trainmen to get as far as possible into the country before the crash happened. My fireman displayed extraordinary agility, but his flight was arrested by the clutches of a barbed wire fence. As he vainly struggled to free his unmentionables from the entanglement, he exclaimed, "If I had left that blamed horseshoe alone, this would not have happened."

Northern Pacific Railroad. Expense of Operating Machinery Department.

We give below particulars of the cost of operating and maintaining the locomotives and cars belonging to the Northern Pacific Railroad during the fiscal year ending June, this year. The record is highly creditable to all those who have contributed to the results shown. For a road traversing a district where labor and supplies are unusually costly, the record is remarkable. The performance is improving too, as can be seen by the figures for 1885, which we have put beside those of 1886 for convenient comparison.

PERFORMANCE OF LOCOMOTIVES, COST PER MILE, ETC.,

For the year ending June 30, 1886. Whole road.

	Mileage.	Cost per mile. 1886.	1885.
Freight train engines	3,728,060	.2791	.3296
Passenger " "	2,257,981	.2146	.2420
Work " "	378,892	.1734	.1671
Switch " "	1,291,071	.1375	.1371
Total	7,656,004	Ave. .2310	.2537

AVERAGE MILES RUN BY ALL ENGINES FOR FUEL, OILS, TALLOW AND WASTE.

	1886.	1885.
Per ton of fuel	32.22	30.25
" Quart of oil, lubricating	34.25	25.67
" " " all kinds	25.94	22.94
" Pound of waste	99.02	80.35

COST PER MILE RUN.

For	Repairs.	Stores.	Fuel.	Wages—Hostlers, wipers, engin'rs, firem'n.	Total.
Freight train engines	.0517	.0050	.1403	.0821	.2791
Passenger " "	.0465	.0042	.0829	.0770	.2146
Work " "	.0236	.0038	.0690	.0761	.1734
Switch " "	.0299	.0036	.0411	.0630	.1375
Total	.0446	.0044	.1044	.0776	.2310

Average cost per mile for water supply ..... .0087
Grand total cost per mile (all expenses here included) ..... .2397

Passenger and freight train engines are allowed schedule miles only. Work train engines are allowed 100 miles per day. Switch engines are allowed 80 miles per day.

LOADED CAR STATEMENT.

	All engines. Cost per car per mile.	Passenger and freight train engines. Cost per car per mile.	Average cars hauled one mile per ton. fuel.	Average cars per train.
Freight	.0181	.0167	414	20.04
Passenger	.0377	.0345	243	6.23

CAR REPAIRS.

Cost per loaded car per mile.

	1886.	1885.
Cost per loaded freight car per mile	.0059	.0053
" " Passenger car per mile	.0126	.0162

TOTAL EXPENSE MACHINERY DEPARTMENT.

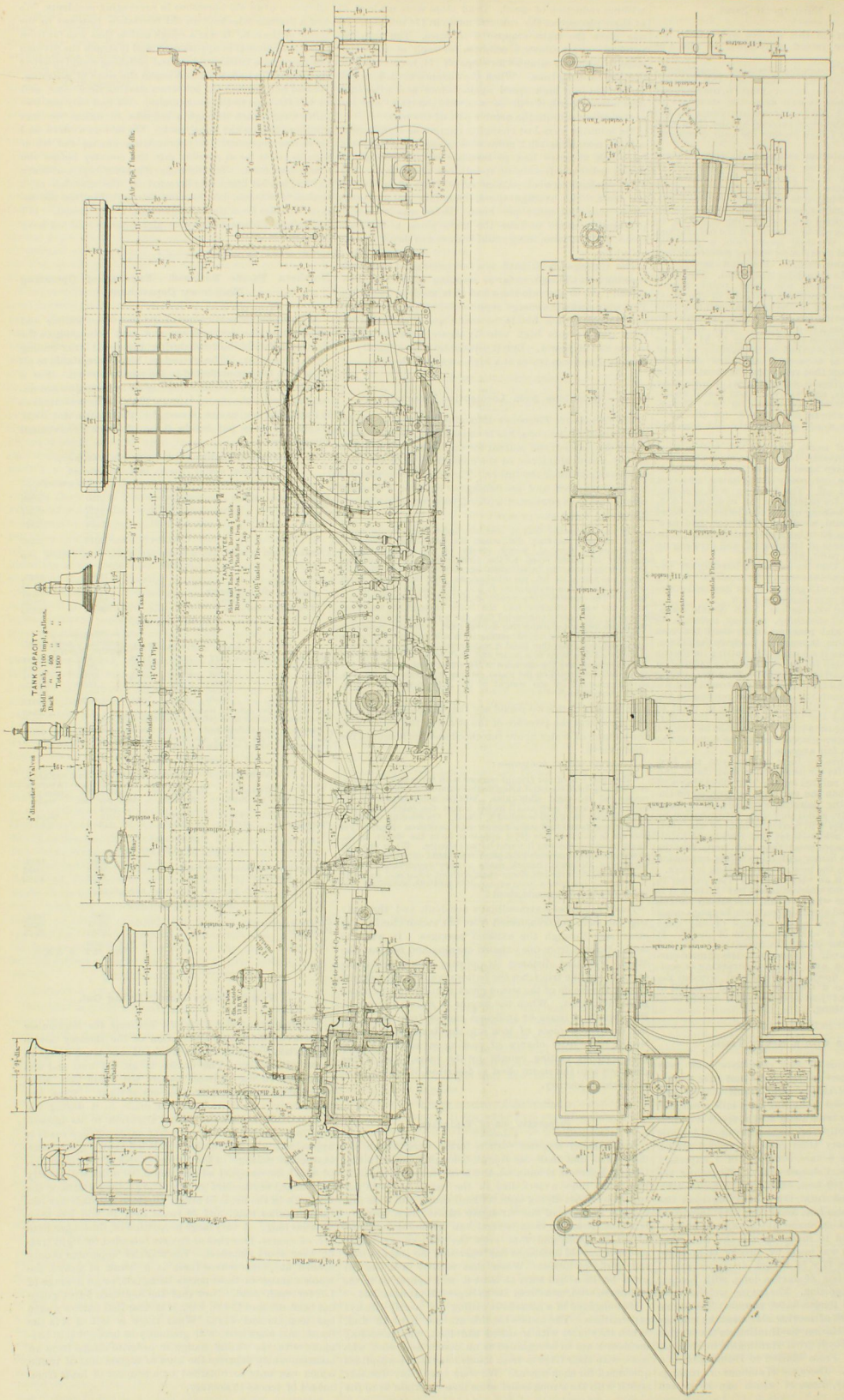
Per loaded car per mile.

	1886.	1885.
Freight train service	.0233	.0295
Passenger " "	.0503	.0575

G. W. CUSHING,
Supt. M. P. M. & R. S.

Narrow Gauge Slowly Dying Out.

The *Journal of the Franklin Institute* for September contains an illustrated description of the Ramsey device for shifting car bodies from trucks of one track gauge to those of another. The device is an old one, and was ventilated in the railroad papers ten years ago, since which it seems to have dropped out of sight. Some improvements are said to have been made in it during the interval, and in order to attract attention to its importance, a detailed list of the present narrow-gauge roads is appended to the description. This list shows a total narrow-gauge mileage in the United States of 12,116 miles, of which the compiler admits that 2,000 miles will shortly be changed to standard gauge. The average length of the 210 roads in the list is 54 miles. Of these, 54 roads are less than 10 miles long, and 30 roads over 10 and less than 20 miles long. A very large proportion of the longer lines are, of course, branches or feeders intended for light traffic over short distances. The transfer apparatus is only needed at points where there is a break of gauge, the whole number of these points being 355, or an average of 1.7 for each road. Now that the Southern 5-feet gauge has been reduced to 4 ft. 9 in., it is clear that narrow gauge has seen its best days. What there is left of it in the South, and elsewhere, will gradually be brought into harmony with the ruling gauge in order to escape from an isolation which deprives the lines of a good deal of traffic which can only be obtained by a transfer of loads from one set of trucks to another.



FREIGHT TANK ENGINE—GRAND TRUNK RAILWAY, GREAT WESTERN DIVISION.

Designed by C. K. Dinneville, Mechanical Superintendent.

Switching Tank Engine, Grand Trunk Railway.

Our engravings illustrate a form of switching and helping engine lately built at the Great Western division shops of the Grand Trunk Railway, from designs made by Mr. C. K. Domville, mechanical superintendent. The engine is reported to give the highest satisfaction for the way she handles heavy loads of cars promptly. The engine has a great many of the features of an ordinary eight-wheel American locomotive, which is of considerable consequence where maintaining uniformity of parts is followed. By extension of the frames, room is made for a coal box and small water tank behind the cab, the overhanging weight being carried by a pony truck. The driving spring gear is of a type largely used in Europe, but little known in America. The springs are underhung and equalized, hangers of a peculiar shape being used, which give economy of space and preserve the full strength of the spring plates, slotting or drilling of the ends not being necessary.

The cylinders are 17 × 24 inches, and the driving wheels 56 inches diameter. The valves are operated by a shifting link motion. The eccentric throw is $2\frac{1}{4}$ inches; travel of valve, $5\frac{1}{16}$ inches; radius of link, $58\frac{1}{4}$ inches. The steam ports are 15 × $1\frac{1}{4}$ inches; exhaust port, 15 × $2\frac{1}{8}$ inches. The valves have $\frac{1}{8}$-inch lap and are set with $\frac{1}{16}$-inch lead.

The tractive power is 122 pounds to every pound of cylinder pressure.

The weight on the wheels is distributed as follows:

Front truck	28,224	pounds.
Leading drivers	28,798	"
Back drivers	28,500	"
Back truck	15,008	"

The boiler is built of steel throughout, $\frac{7}{16}$ inch thick, is straight 48 inches diameter, and has a steam dome forward of the fire-box 27 inches diameter and 24 inches high. There are 138 tubes, 2 inches diameter and 11 feet $1\frac{5}{8}$ inches long between tube plates. The tubes in the fire-box end are swedged down to $1\frac{7}{8}$ inches, and have a copper ferrule bronzed on the outside. Both ends of the tubes are beaded and expanded.

The fire-box, which is entirely of steel, is $70\frac{1}{2}$ inches long by $35\frac{1}{2}$ inches wide. The crown sheet is arched, and is secured to the shell by sixteen rows of radial stay-bolts 1 inch diameter, set $4\frac{1}{2}$ inches apart, cut with screw threads twelve to the inch, screwed through both sheets and riveted. The back tube sheet is $\frac{1}{4}$ inch thick, the front tube sheet $\frac{3}{8}$ inch thick, back sheet, crown and side sheets $\frac{5}{16}$ inch thick. A single sheet is used for sides and crown.

An open smoke-stack is used, and a diaphragm and netting are employed to prevent spark throwing. The sparks arrested in the smoke-box are blown back to the fire-box through two of the lowest tubes by means of steam jets located in the smoke-box and worked from the cab.

The saddle tank capacity is 1,320 gallons, and the back tank holds 480 gallons. The coal bunk carries three tons. Like all engines on this division of the Grand Trunk Railway, this one is fitted with Ramsbottom safety-valves.

Master Car and Locomotive Painters' Association.

The Association held its seventeenth annual convention at Chicago, Sept. 9 and 10. Mr. Fred S. Ball, of the Pennsylvania R. R., occupied the chair. The following members were in attendance:

Wm. Sharp, Lake Shore & Michigan Southern, Adrian, Mich.
Robt. McKeon, New York, Pennsylvania & Ohio, Kent, O.
John Rattenbury, Chicago, Rock Island & Pacific, Chicago, Ill.
J. C. Stout, Union Pacific, Kansas City, Mo.
M. W. Stines, Barney & Smith Manufacturing Co., Dayton, O.
John H. Will, New York Cent. & Hudson River, West Albany.
Jos. Murphy, Louisville & Nashville, Louisville, Ky.
H. M. Billings, Pittsburgh, Cincinnati & St. Louis, Columbus, O.
George O. Weidner, Lake Shore & Michigan Southern, Buffalo, N. Y.
B. F. Harris, Cleveland, Akron & Columbus, Mt. Vernon, O.
A. P. Sweet, Detroit, Lansing & Northern, Ionia, Mich.
Samuel Brown, Old Colony, Boston, Mass.
E. F. Joslyn, Lehigh Valley, Delano, Pa.
E. L. Fetting, New York & New Haven, Norwood, Mass.
James M. Brady, Rome, Watertown & Ogdensburg, Oswego, N. Y.
E. J. Aubry, Chicago & West Michigan, Muskegon, Mich.
A. J. Bishop, Clev., Colum., Cin. & Indianapolis, Delaware, O.
F. S. Ball, Pennsylvania Railroad, Altoona, Pa.
W. J. Russell, Grand Rapids & Indiana, Grand Rapids, Mich.
Geo. H. Rattenbury, Cresson Car Works, Coburg, Ont.
E. L. Bigelow, Baltimore & Ohio, Baltimore, Md.
M. L. Sims, East Tennessee, Virginia & Georgia, Atlanta, Ga.
John A. Pulz, Wisconsin Central, Stevens Point, Wis.
H. W. Walton, Providence & Worcester, Valley Falls, R. I.
Geo. W. Lord, Fitchburg, Fitchburg, Mass.
Wm. Hibbard, Boston & Albany, Allston, Mass.
W. T. Ledford, Richmond & Danville, Manchester, Va.
C. C. Wood, Geneva, Ithaca & Sayre, Sayre, Pa.
H. W. Scott, Canadian Pacific, Montreal, Que.
Alex. Campbell, Manhattan Elevated, New York.
John T. Ceckburn, Chicago, St. Louis & Pitts., Logansport, Ind.
D. Herbage, Flint & Pere Marquette, East Saginaw, Mich.
S. E. Kirkpatrick, Pullman Palace Car Co., St. Louis, Mo.
Wm. Lewis, Grand Trunk, London, Ont.
Frank M. Weidner, New York, Lake Erie & Western, Buffalo.

The following became members of the Association at this convention:

C. C. Young, Chicago, Rock Island & Pacific, Trenton, Mo.
Jacob Hoesly, Pennsylvania Railroad, Newark, N. J.
A. J. Moriarity, Baltimore & Ohio, Newark, O.
Thos. E. Coins, Chicago West Division Railroad Co., Chicago.
E. A. Cole, New York, Chicago & St. Louis, Chicago.
T. Laughran, Milwaukee, Lake Shore & Western, Kaukauna, Wis.
W. H. Martindale, Lehigh Valley, Ithaca, N. Y.
Henry L. Libby, Charles River Railroad, Boston, Mass.
A. E. Barker, Chicago & Northwestern, Austin, Ill.
A. C. Sensenbach, Pensacola & Atlantic, Pensacola, Fla.
L. W. Smith, Cleveland & Pittsburgh, Wellsville, O.
Fred. Johnson, Chicago, Burlington & Quincy, West Burlington, Iowa.
J. D. Wright, Chicago, Rock Island & Pacific, Keokuk, Iowa.
Byron Stansbury, Union Pacific, Omaha, Neb.
J. B. Miller, Lake Shore & Michigan Southern, Norwalk, O.

The Treasurer reported $262.25 in the treasury, against $377.61 the year before, the income having been $12 from initiation fees and $111 from the annual dues, and the disbursements $238.36.

Amendments to the by-laws, providing for standing committees, were adopted, and members of the committees appointed as follows:

Committee of Information.—To answer questions proposed by members between conventions: E. A. Barker, Wm. Sharp, Robert McKeon, John Rattenbury, J. C. Stout, M. W. Stines.

Advisory Committee.—To prepare topics for discussion at conventions: Fred. S. Ball, J. H. Will, Joseph Murphy, G. O. Weidner.

Committee on Tests and Practical Experiments.—To formulate rules for making tests and to make reports on the results of tests: E. L. Fetting, H. M. Billings, A. N. Bradley, B. F. Harris.

The subjects, as previously announced, were then taken up in their order.

1. What remedies can we employ to prevent the cracking of painted and varnished surfaces?

Upon this subject Mr. M. W. Stines read a paper. Mr. Wm. Davis, of the Canada Southern, sent a paper on the same subject, which was read by the secretary.

2. Are passenger cars now receiving proper care; what change, if any, can be recommended to lengthen the durability of our painting?

Papers on this subject were read by Mr. Jos. Murphy and Mr. A. J. Bishop, and discussed by Messrs. Rattenbury, Stout and Barker.

3. That flat surfaces and flat colors are preferable to glossy ones for interior decoration and finish.

A paper was read by Mr. E. L. Fetting in the affirmative of this question, which was all that was said on the subject.

4. Improvements in methods and materials.

The members appointed to discuss this subject were not present, and it was not discussed.

5. When paint on baggage, mail and express cars becomes badly cracked, it is more economical to burn off the paint than to put on new sheathing.

Mr. R. McKeon read a paper in which he took the affirmative of this proposition, after which a resolution in favor of burning off paint was unanimously adopted. Mr. McKeon's paper will be found below.

6. Would it not be economy to use a higher grade of paint stock if it could be procured?

No papers were read on this subject, but it seemed to be the opinion of the meeting that the best was the cheapest at any price.

7. Does it make any difference in the finish of a coach whether the nail holes are deep or shallow, large or small, or whether the surface is leveled up by the wood worker or filled up by the painter?

Messrs. Hibbard and Herbage read papers on this subject, the former taking the affirmative of the question and the latter the negative.

8. Has the paint material that you have used in the past year compared favorably with the material used in previous years?

A paper by Mr. H. W. Walton was read by the secretary, in which he said the material he had used during the past year was not inferior to that used by him in previous years.

The following officers of the Association were chosen for the ensuing year: President, J. C. Stout, Union Pacific Railway; Vice-President, E. L. Bigelow, Baltimore & Ohio; Second Vice-President, Joseph Murphy, Louisville & Nashville; Secretary and Treasurer, Robt. McKeon, New York, Pennsylvania & Ohio.

The convention then adjourned to meet next year in the City of New York.

While in the city, the members were hospitably entertained by the representatives of the following houses who constituted the entertainment committee: Clarence Brooks & Co., New York; Valentine & Co., New York and Chicago; Murphy & Co., New York and Chicago; Moses Bigelow & Co., Newark and Chicago; Cary, Ogden & Parker, Chicago; Wolf, Patten & Co., Pittsburgh; L. F. Rosenberg & Co., New York; Alston Manufacturing Co., Chicago; Thresher & Co., Dayton, O.; Wadsworth, Howland & Co., Chicago; Coffin, Devoe & Co., Chicago; Sherwin Williams Co., Cleveland; Shipman & Bolen, Newark, N. J.; Edw. Smith & Co., New York; Berry Bros., Detroit, Mich.; Heath & Milligan Manufacturing Co., Chicago; De Golyer & Bro., Chicago; Hildreth Varnish Co., New York.

Western Railway Club.

The first meeting for the season was held in the Grand Pacific Hotel, Chicago, September 22. There were present: Messrs. Pierce, Forsyth, Pullman, Johann, Johnson, Verbryck, Rhodes, Gibson, Crosman, Scott, Thompson, Ettinger, Sinclair, Gilmor, Smart, Burkhardt, Buhoup, Burtes, Butler, Gore, Cooper, Royal, and several visitors.

President Pierce occupied the chair and announced that the election of officers being part of the business of the meeting, the proposal for a nominating committee would be in order.

Messrs. Verbryck, Johann and Forsyth were nominated for this committee.

RULES OF INTERCHANGE OF CARS.

President Pierce announced that the first subject for discussion was the proceedings of the Master Car Builders' Association at Niagara Falls, and called upon Mr. Rhodes to open the discussion.

Mr. G. W. Rhodes (C., B. & Q.) thought the whole proceedings made too wide a subject, and believed it would be better to discuss the portions they were most interested in. He suggested that the rules of interchange be taken up and discussed. Other clubs in the East followed the practice of discussing this and kindred subjects, with the result that the members got familiar with them, and came to know exactly where the weak points lay. From this had sprung a movement in the East calling upon members to enforce certain rules, and action of the kind was likely to benefit railroad companies as well as the members of the clubs.

Mr. W. A. Scott (C. & N. W.) highly approved of the suggestion made by Mr. Rhodes, and felt assured that a thorough discussion of these rules would do good. The business was often hurriedly pushed through at the M. C. B. conventions, and decisions were made without proper deliberation. If clubs of this kind discussed the subjects beforehand, they could influence decisions. Since the last convention, many questions about interchange of cars had come up which ought to have been settled there. By united action they might facilitate the settlement of important rules.

Mr. Verbryck (C., R. I. & P.) acknowledged that the rules adopted had proved defective. He thought this club could give assistance in settling the rules, and discussing them would lead to a better understanding of their interpretation.

Mr. G. W. Stevens (L., S. & M. S.) doubted if it would be wise to discuss changes on rules already adopted.

Mr. W. B. Snow (I. C.) thought the rules were all right, and did not wish to see them tinkered with.

Mr. Johann (C. & A.) held a different opinion. The rules might be all right, but he wanted to hear his neighbors' interpretation of certain parts. This would help to make the rules popularly understood.

Mr. Scott said that the car equipment was being changed and developed every year, and it was their duty to keep moving. Other clubs had shown their influence by united action, and it behooved this club to do likewise.

Mr. W. Forsyth (C., B. & Q.) read a notice from the Eastern Railroad Club intimating that they intended taking up the Rules of Interchange and other important subjects.

Mr. L. E. Johnson (C., B. & Q.) moved that the subject for discussion at next meeting be the first six rules of interchange of cars. This was agreed to.

ELECTION OF OFFICERS.

The nominating committee reported the names of G. W. Stevens for President; H. L. Cooper for Vice-President; Angus Sinclair for Secretary, and W. B. Snow for Treasurer.

Mr Rhodes moved that the recommendations of the committee be accepted, which was carried.

Mr. Stevens declined to serve on account of living so far from Chicago. He considered the president ought to reside where the meetings were held.

Mr. W. A. Scott was then elected in place of Mr. Stevens.

Mr. G. W. Stevens proposed that the second subject for discussion at next meeting be driving wheel centers and section of tire for driving wheels.

After some formal business the meeting adjourned.

Meeting of the Freight Train Brake Committee.

A joint meeting of the brake committee of the Master Car-Builders' Association and of representatives of the several brake companies who participated in the July tests at Burlington, was held in New York, Sept. 16, 1886. Present, Messrs. G. W. Rhodes, Chairman, and Jno. S. Lentz, of the committee; Jno. B. Gray, Geo. H. Poor, American Brake Co.; J. H. Slade, A. P. Massey, Eames; T. W. Welch, H. H. Westinghouse, Westinghouse; W. P. Widdifield, Widdifield & Button; R. M. Agnew, Rote; A. M. Wellington, *Railroad Gazette*, Referee.

After two or three hours' informal discussion the following resolutions were unanimously adopted:

1st. *Resolved*, That in view of certain changes being desired in the brakes tested at Burlington, the proposed endurance test following the first series of brake tests be abandoned.

2. That each of the late competitors at Burlington be allowed the privilege of entering the tests of April, 1887, with their brake-gear modified in any manner they deem best suited to show its highest efficiency.

3. That any additional competitor who may be desirous of entering the 1887 or final tests with a train of 50 cars, in conformity to the rules and conditions which may be established at the discretion of the committee, be admitted to the competition.

4. That a programme for the 1887 tests and a following endurance test shall be drawn up by the committee, with discretion to modify the same from time to time, as may appear necessary to bring out all important points of each brake with least loss of time.

The chairman stated that for the information of those present a joint meeting to consider the new tests would be called some time during the month of February, 1887.

In the discussion that followed, the sense of the meeting seemed to favor close instead of slack couplings.

Mr. Slade suggested that as two months before the test might be a little too close to the tests to change equipment, it would be better for the committee to state now whether close or loose couplings would be prescribed, in view of their experience at Burlington.

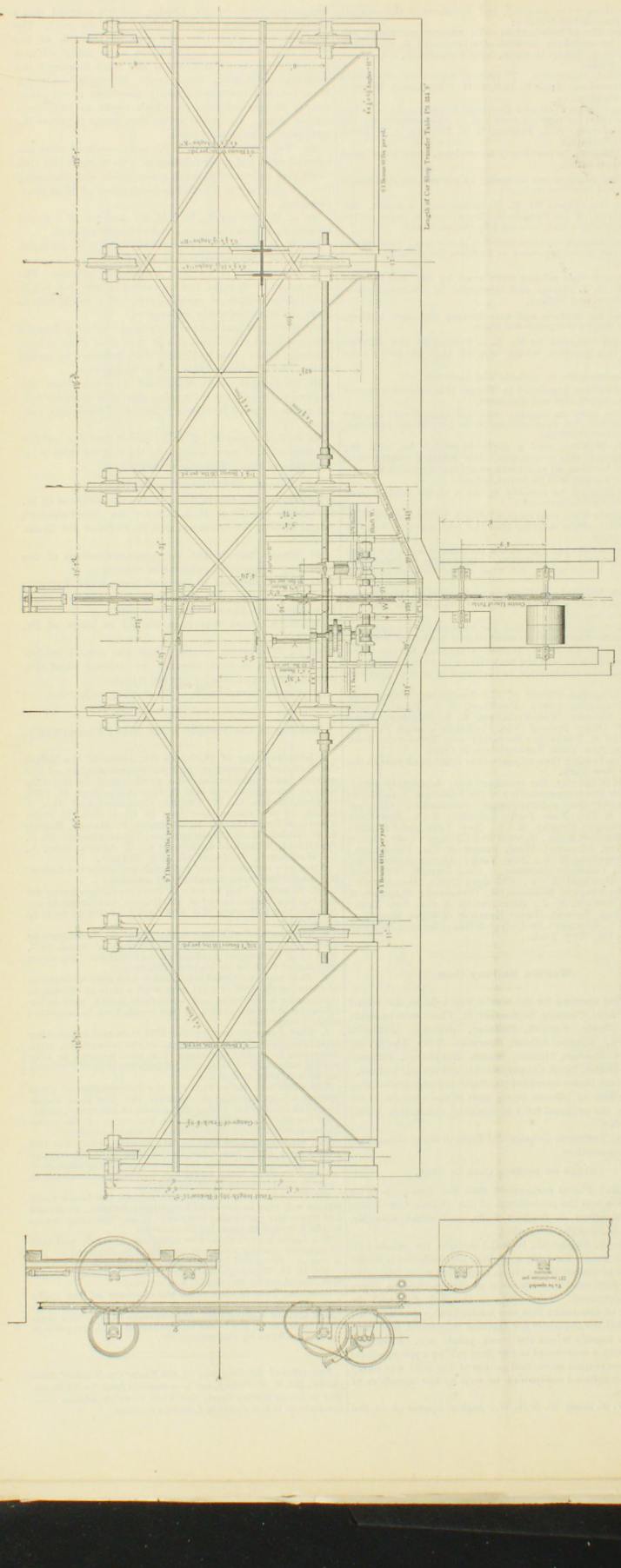
Mr. Rhodes: I don't know whether all the brake companies will care to use close couplings; further, we should not name any particular coupler. If any company wants to use a wedge instead, let them do so.

Mr. Lentz moved that close couplings be used, and that companies coming with link couplings be required to use a wedge. Seconded by Mr. Slade, and carried.

Mr. H. H. Westinghouse offered the following resolution, seconded by Mr. Slade, and carried:

Resolved, That in view of all the expenses of the brake tests for 1886 having been borne by the Chicago, Burlington & Quincy Railroad Co., the expenses of the 1887 tests shall be borne by the brake companies in such proportion as may be fixed by the committee.

THE office of the Secretary of the Master Car-Builders' Association, Mr. M. N. Forney, has been removed from No. 73 Broadway to No. 23 Murray street, New York, to which address communications to him should in future be directed.



TRANSFER TABLE—CHICAGO & ALTON RAILROAD. *Designed by Wm. Wilson, Superintendent of Machinery.*

Transfer Table—Chicago & Alton Railroad.

The engraving shows a plan and end view of a transfer-table designed by Mr. Wm. Wilson, Superintendent of Machinery of the Chicago & Alton Railroad, and recently built under his supervision for the car shops of the road at Bloomington, Ill. The table is built entirely of iron. It is 65 feet long, and is carried by six pairs of wheels placed 12 feet 7 inches apart. The table is so strongly built and is so long that the heaviest and longest cars yet in railroad service can be handled by it with the greatest ease. The table is operated by power transmitted through a wire cable moving in a small pit that traverses the whole length of the table pit. The cable is driven by a pulley sunk in the ground at the end of the pit, and receiving motion from the shop shafting. The cable engages on the table with the wheel *W'* operating the shaft W, which is speeded for 290 revolutions per minute giving a traversing speed of 25 feet per minute to the table. On the shaft *W* is a friction clutch of a very simple design which enables the operator to transmit the motion of the shaft *W* to the transversing shaft *X* or to the winch shaft *Y*, as desired. The transversing shaft *Y* moves four of the wheels that carry the table, and they give ample adhesion for transversing in all kinds of weather. During the heaviest snow storms of successive winters, a table similar to this one used in connection with the machine shops at Bloomington, has been worked without trouble. The winch already referred to on the table is used for pulling cars on and off and moves the rope 32 feet per minute. Two men do the whole work of transferring cars with this table and its attachments, and no workman is ever called from his business to help in pushing cars in or out of the shops. When the table is not needed the cable is thrown out of action at its connection with the shop shaft.

Attempt to Destroy a Signal Tower.

About the most unscrupulous and ourtageous of the many strikes that have disgraced this year of labor conflicts was that of the switchmen of the Lake Shore & Michigan Southern Railway at Chicago. The men had no fault to find with their hours of labor or the amount of work they were required to do. They had no complaint to make of the treatment they received from the company, and the wages paid were accepted as satisfactory, but, because a few men who did not belong to the union were permitted to work in the yards, the switchmen in a body not only refused to work themselves, but undertook to prevent others from handling cars in the yards. The railway company righteously declined to discharge the non-union men, and by their just action had to meet one of the most persistently fought strikes ever waged. The struggle carried on by the company was rendered doubly hard by the apathy of the Chicago authorities, who were responsible for the maintenance of peace and order, but who provided the company with practically no protection against the violence and outrages of lawless men. By determined courage the company kept the business moving and vanquished the strikers, but some of the men who tried to rule or ruin are still pursuing in a small way the ruin policy by destroying the company's property. Their acts generally take the form of sneaking up to switches and throwing them while trains are passing, with the result of ditching a few cars. But one night last month an outrage of unusual magnitude was perpetrated. There is an interlocking switch and signal tower at the intersection of 14th street and the Lake Shore tracks. The strikers seemed to believe that the destruction of this tower would seriously interfere with the movement of the trains, and a dynamite bomb was thrown into the basement of the tower, where it exploded, doing considerable damage. But no one was hurt, and the act caused no delay to trains. A notable thing connected with the outrage was, that among the many daily papers published in Chicago and presumably interested in the maintenance of law and order, scarcely a word of protest was written against this wanton act of malevolence. When acts of violence are treated with indifference until they assume the proportions of wholesale murders, that place may expect to be startled periodically by acts like the Haymarket massacre.

Want of Good Train Brakes in England.

Nearly all passenger trains in Great Britain are now equipped with continuous brakes of some sort, but there is great want of uniformity, connecting lines in many instances using brakes that cannot be worked by the locomotives of foreign roads. Non-automatic brakes are still used to a great extent, and cause many accidents and much alarm. In a single copy of a paper we recently noted two serious accidents due to this defect of brakes which might easily have been catastrophes. On the East London Railway a carriage jumped the track on a curve, and the train kept running about 300 feet when the derailed carriage struck the girder of a bridge, tearing the body away from the wheels. Four passengers were severely injured. It was acknowledged that the train, which was running at moderate speed, could have been stopped before

the derailed car reached the bridge if the conductor had been provided with the prompt means of stopping afforded by an automatic brake.

At the same time an accident on the London & Northwestern Railway at New Street Station, Birmingham, is thus described:

The engine became detached from the carriages from a London train due at New street at 2:10 P. M., through the breaking of a coupling pin. The train was proceeding at a very rapid rate, and as there is a steep incline from Monument Lane through a long tunnel into New street station, the speed became accelerated to an alarming degree. The driver was compelled to put on steam to prevent the carriages running into and over the engine, and the result was that the whole train dashed through New street station—according to the accounts of persons who saw it—almost like a flash of lightning. Terror prevailed among the passengers, and one of them, James Robinson, in endeavoring to escape from the train during its rush through the station, fell on to the line and sustained a fracture of the skull and other injuries, and was taken to the hospital. The train was not stopped until it reached Banbury street station. A number of passengers were injured by the shock. Mr. Chamberlain, M. P., is said to have been on the platform waiting for the train to proceed to London, and it may be hoped that he was satisfactorily impressed with the desperately useless character of the brake to which the London and Northwestern Company assign the care of the lives of their passengers by high-speed trains. But for the presence of mind of the driver a fearful smash of everything would probably have resulted through the absence of an automatic continuous brake, which would have stopped the train immediately the coupling severed.

Proportions of Locomotives.

"It is a noteworthy fact," says an English contemporary, "that however much change may be effected in the type of a locomotive, certain proportions appear to be incapable of alteration without doing harm; 2½ square feet of heating surface ought to be provided for each square inch of piston area, or, what comes to the same thing, the area of one piston multiplied by 5 will give the proper heating surface. Thus, the area of a 17 in. piston is 227 square inches, and 227 × 5 = 1,135 square feet. An 18-in. cylinder has an area of 254.4 in. and 254.4 × 5 = 1,272. In like manner, the proper surface for 19-in. cylinders is 1,417 square feet. Of course, this is not to be regarded as a hard-and-fast rule, but it will be found that it is quite in accord with the best locomotive practice of the day, and that when an attempt has been made to reduce the poroportion, the engines have not proved good steamers with heavy trains. On the Great Southern & Western Railway of Ireland 18-in. cylinders go with 1,050 ft. of surface, but the stroke is only 24 in. On the Great Eastern Railway we have 1,200 ft. with an 18-in. cylinder, 26 in. stroke, and on the Brighton Railway, 1,485 ft., with an 18½ cylinder, 26 in. stroke. It must not be forgotten, however, that a boiler with too little heating surface may be made to steam better by increasing the size of the fire-box, and we could name instances where locomotives have been greatly improved by having had the backs of the fire-boxes taken out and the fire-boxes lengthened 12 in."

The proportions mentioned apply fairly well to ordinary American practice, but where poor steaming coal is used, a greater proportion of heating surface to cylinder area gives better results. According to the table of dimensions of Northern Pacific locomotives, published in the NATIONAL CAR AND LOCOMOTIVE BUILDER in July of this year, it will be seen that the standard mogul engine, with cylinders 18 × 24 in., has 1,593.6 square feet of heating surface; and the 17 × 24 in. standard eight-wheel engines have 1,356.6 square feet of heating surface. On this subject, Mr. G. W. Cushing writes us: "In a recent specification I have adopted $3\frac{1}{6}$ square heating surface to one square inch area of cylinder, counting, of course, both cylinders; and $\frac{78}{100}$ square inch of flue opening to one square inch of cylinder area—a total heating surface of 1,601 square feet for 18 × 24 in. cylinder engines. The 'Decapod' engine soon to be delivered to us from the Baldwin works, has this proportion of heating surface to cylinder area, and will, I believe, be the heaviest engine yet built."

We consider Mr. Cushing's plan of proportioning the heating surface to cylinder area is preferable to the English way of figuring from the piston area alone, although the rule for the latter plan has the advantage of being easily remembered.

New Method of Screw Making.

Mr. Charles Fairbairn, of Manchester, England, a well-known mechanical engineer and inventor, has been working for several years on the production of a machine that would produce screws by a process of rolling, the thread to be formed by the enforced flow of the metal instead of by cutting. His labors in this direction have proved very successful, and machines are in operation that roll screws from ¼ inch up to any size that roll-screws are wanted. We have examined screws made by this process, which are as accurate as if cut by the sharpest dies, and they have the merit of being much stronger than cut screws.

Screws made in the ordinary way, by cutting a continuous groove round a bar of iron, is an operation that ought to be capable of improvement. When the material cut is fibrous, the fibers being cut across at short intervals, renders the thread which is left between the grooves very liable to be stripped, and it is well known that steel subjected to the cutting treatment will readily snap when struck with a sudden blow.

To get over these defects of cut threads is the object of Mr. Fairbairn's invention. The method of operation is as follows: A series of rollers, which may be two, three or four, but not more in number, have grooves cut on their peripheries corresponding in shape and pitch to the threads which may be desired for a bolt. The screw blank while hot is placed between these rollers, and the heated blank is caused to revolve by its pressure and at the same time receive the reverse impression on the bolt, which is a screw thread. The thread is, as it were, dovetailed into the body and then welded on the bolt, which thus becomes a portion of the bolt itself, and cannot be stripped or knocked off as with a cut thread. The strength given to the thread by this process makes bolts so produced particularly suitable for car trucks, rail joints and other service where great durability is necessary. We are assured that iron or steel bolts when threaded in the machine will bend to a greater angle without breaking than the plain metal would admit of. In Britain screws made by this process are coming into extensive use for vises, screw-jacks and all other purposes where strength and the capability of withstanding hard usage are required. The makers of these machines, Messrs. Fairbairn & Wells, are prepared to negotiate for sale of the American and Canadian patents, so we expect to see the process introduced here soon.

Gas for Locomotives.

The Philadelphia company is arranging to pipe gas into the yards of the Pennsylvania Railroad Company, into a big reservoir that is to be put up there for the purpose of supplying the tanks of engines that are to be built to be run by natural gas. "The scheme is perfectly practicable," said anofficer of the Philadelphia company recently.

"It has been said the gas is so volatile that no tank can be constructed that will hold it. This is all nonsense. We shall demonstrate not only the practicability of confining the gas, but the fact that it may be used as a fuel aboard engines so cheaply, that in a short time not a locomotive running into or out of this city will use coal. It was held two or three years ago that artificial gas could not be used to illuminate passenger cars. The Pennsylvania railroad is using nothing else in its trains on the Pittsburgh division, and with the most satisfactory results. We feel sure that the road will not be very long in showing the other railroads of the country that it will run locomotives more cheaply than they can hope to.

"As it is now, the coal bills of a company are the biggest items of outlay in the exhibit of expenses. It takes nearly a bushel of coal to run an engine a mile. This is when the locomotive is in motion. Frequent stops and starts increase this item slightly. The gas will be infinitely cheaper. Engines will, of course, have to be furnished with tanks. These will be so arranged with the compressors as to contain very large quantities of the gas, so that no accident or unexpected delay will be sufficient to so diminish the supply as to embarrass the movements of the engine. The details of the plan will be more fully set forth as soon as possible. The matter has been discussed by some of the best mechanical engineers of the country, and nearly all of them think it practicable. Engines on this division are only run as far as Altoona."—*Pittsburgh Commercial Gazette.*

Record of the "Bee" Locomotive.

The twelve-wheel locomotive called the "Bee," which Mr. Alexander Mitchell designed and built some years ago for the Lehigh Valley Railroad, has been a very successful engine for the heavy work of pulling coal over mountain grades. This form of engine has four pairs of drivers coupled and a pair of carrying wheels in front and one pair at the back end of the frames. The hind pair of drivers have no flanges, the pony truck acting as a leader when the engine is backing. This arrangement makes a short, rigid wheel-base, which gives the engine great freedom in passing the sharp curves on the mountain grades. No trouble whatever is experienced from flange cutting. The engine has made rather a remarkable mileage without repairs. She began work by hauling coal trains in December, 1883, and up to August last had made 65,605 miles in that service without having tires turned or valves faced. The Delancy balanced valve is used, and the record mentioned is high testimony regarding the value of the device. The "Bee" was illustrated in our issue for October, 1884.

Introduction of the American Locomotive into British Colonies.

Mr. Wm. E. Lockwood, of Philadelphia, an industrious student of all matters pertaining to railroad machinery, although not a railroad man himself, writes to the *Fireman's Magazine:*

"The history of the introduction of the American locomotive into the British colonies is rather an interesting one. Many years since, two lads, who were schoolmates in England, were placed as assistants to the uncle of one of them, who was superintendent of motive power of one of the large railways in England. While they were yet young men, they decided to seek their fortunes in different parts of the world. One of them came to America, and is now at the head of one of the largest Eastern drug and paint warehouses, and has also been president of and director in a number of railways. The other sought his home in Australia, and became superintendent and purchasing agent of the Australian railways. By accident, they met on the continent of Europe. The first named of these was traveling with his family for pleasure, the other for business and pleasure combined. To all intents and purposes, they were unknown to each other, but, in a casual conversation, each found the friend of his youth. The one from Australia mentioned the fact that his business was to purchase locomotives for the Australian railways, and asked his friend's advice as to what class of locomotives were best adapted to these railways. His friend, having had experience on both English and American railways, advised him by all means to buy the American locomotive, because of its flexibility and adaptability to the railways of the colonies, as it was best adapted to the American railways for the same reason, and this circumstance is said to be the reason of the introduction of the American locomotives in the English colonies.

"It is said to be a fact, which I do not vouch for, that the American locomotive can run efficiently upon the English home railways, but that an English locomotive, owing to its rigidity, and adaptability to rigid road-beds, cannot run upon an American railway."

Two Qualities of Steel for Car Springs.

The A. French Spring Co., Limited, of Pittsburgh, have issued a circular dated Sept. 10, in which they say:

"Owing to the growing disposition on the part of consumers to procure material of all kinds at lower prices, manufacturers have been compelled to look for cheaper grades of material. In view of this fact, we have decided to manufacture springs from two qualities of steel. While we have always used and advocated crucible cast steel in the manufacture of railway locomotive and car springs, and experience proves that in the end it is the most durable, and hence the most economical. Some railroad companies, however, have adopted an analytical, as well as a physical, standard of their own, for the guidance of manufacturers, and which permits the use of steel manufactured in bulk, and therefore much cheaper than that quality of steel known as crucible. These railroad companies ask no guarantee, and assume the responsibility of the springs giving good service, insisting only that the springs pass the physical and analytical tests to which they are subjected at the time they are furnished. But, as a comparison of value, it may be stated that crucible cast steel springs are now in service and in good condition that have been in constant use for over sixteen years, to our knowledge. It is our aim now, as ever, to produce the best and most serviceable springs at a fair and reasonable price. We shall use the highest quality of crucible cast steel, as heretofore, and the best grade of special steel; and our patrons can always depend upon obtaining from us just what they order, and the best of its kind, leaving it optional with them as to what quality they desire to use. The difference in the cost of the springs will only be the difference in the cost of the material used, as our method of manufacture will be exactly the same in both cases. We shall use nothing but the best quality of crucible cast steel in the manufacture of our locomotive springs."

Chicago & Northwestern Rolling Stock.

From the twenty-seventh annual report of the Chicago & Northwestern Railway Company, we learn that 3,948.71 miles of road are now operated by the company. To per form the work of operating this long aggregate of track, 698 locomotives are used and 21,544 cars. Of the latter, 258 are first-class passenger cars. There are 227 cars of other descriptions used in passenger service, such as second-class cars, baggage cars and others not reckoned as first-class; but this does not include the sleeping cars that are run over the system by the New York Central Sleeping Car Co. The freight and working equipment embraces 21,059 cars. Of this 1,914 are live stock cars and 117 refrigerator cars. There are 26 pile-driving and wrecking cars.

During the last year, 26 locomotives and 490 cars have been added to the rolling stock equipment. The total engine mileage made during the year was 22,571,327 miles. Adding half the increase of locomotives to the number on hand at the beginning of the year, a very fair estimate, seeing that many of the new engines were not put in service till well over in the season, we find that every engine belonging to the company made 33,000 miles running during the year, a particularly high average. Repairs cost 3.95 cents per mile, a saving of .25 of a cent, or 5.95 per cent. less than last year; the wages of enginemen and wipers was 6.95 cents, an increase of .15 of a cent; fuel cost 6.91 cents, a saving of 1.23 cent, or 16.04 per cent.; oil, waste and tallow cost .47 of a cent, a decrease of .04 of a cent, or 7.84 per cent. less than last year. The total expenses were 18.28 cents per mile, a decrease of 1.46 cent, or 7 40 per cent less than last year. The showing is highly creditable to Mr. Tilton, the superintendent of motive power, and to all members of his department.

A NEW railroad was recently completed through a Dakota town. The first train that ran over it carried an excursion that included the editor of the local paper. The track was very rough and he jolted around, lost his hat out of the window, had a stove fall on him, and he was bitten by one of the directors' dogs. A tramp who was stealing a ride picked his pocket of his pass, and a drunken conductor kicked him off the train just before they got back because he couldn't show it. He walked four miles across the country to get home, and the next week said in his paper: "We cannot too warmly congratulate our many readers over our good fortune in the J. Y. & P. D. Q. railroad going through this place. Equipped with elegant coaches and a well ballasted road bed, it makes traveling over it a real pleasure. Another feature is the gentlemanly attendants, and also the courteous treatment invariably accorded to passengers. Ladies traveling alone over this road, and receiving the same kind attention that we did on the recent excursion, will not miss any home comforts."

Communication.

Performance of the Eames and Westinghouse Brakes at Burlington.

Editors National Car and Locomotive Builder:

To the major part of the editorial on the Burlington Brake Tests, published in your September number, no exception can be taken. Some of its statements, however, may reasonably be said to be open to criticism, as calculated, without explanation or qualification, to convey wrong impressions respecting the comparative performance of the Eames and Westinghouse brakes.

In the second paragraph occurs this sentence: "In respect to the supply of power, the certainty, quickness and smoothness of stops, ready release and absence of breakage, the Westinghouse shows on the whole the best record."

So far as the power is concerned, it is conceded that more pressure was applied to the brake-shoes by the Westinghouse than by the Eames brake, and that the extra power necessarily resulted in quicker stops. It is claimed by the Eames Company, however, that the power used by the Westinghouse brake was in excess of what may be properly and economically used in regular freight service, as was shown by the continual severe skidding of the wheels, both in the emergency and service stops. Either master mechanics, master car-builders and other railroad officials are wasting a great deal of time in discussing a trivial matter, or the sliding of wheels both upon passenger and freight service is a serious evil. The only way to prevent it is to reduce the power at the expense of proportional quickness of the stops. The Eames power was purposely limited to less than the skidding point, correspondingly increasing the length of the stops. It could have been increased indefinitely, if desirable.

The smoothness of stops of the two brakes depended upon the condition of the trains, and was not an effect of the brakes. In point of quickness of application of the brakes, the records will show an advantage in favor of the Eames brake. It was applied slightly quicker than the Westinghouse. The difference was not sufficient to be material, however, and it may fairly be said that in respect to time of application, uniformity of application throughout the train and steadiness of pressure, their results were practically identical. This being so, it is evident that any variation in smoothness must result from causes other than the action of the brakes. This was seen by the result of a Westinghouse train run with the slack taken up with wedges. What, without them, was an exceedingly violent and dangerous stop, was converted by them into a safe and comparatively smooth stop. The action of the brake was, of course, the same in both cases.

The Eames train had more slack than the Westinghouse train, and was inferior in other respects, which affected the smoothness of its stops. Other things being equal, the smoothness of stops would depend upon the steadiness and evenness of the pressure of the brakes upon the wheels, and in this respect your editorial says the Eames brake "surpassed all competitors."

The breakages in the Westinghouse train were very much more serious than those of Eames. The damage to the latter consisted almost entirely of broken draw-bars. Its draw-bars were old-fashioned, round faced and without shoulders. They were at different heights, so that they did not come together squarely and in the same line, but struck at angles, resulting in a lateral blow which broke many of them. The Westinghouse train broke draw-bars, centre-plates and sheared king-pins, beside other damage. After two emergency runs with fifty empty cars the condition of the train was such that the committee considered it dangerous to make another emergency run and substituted service stops instead.

That the shoes upon the Eames train were entirely new, was the result of misunderstanding a statement of the chairman of the committee. He was understood to reply to a question of a representative of the Eames Company, that all the trains were required to be so equipped. Other than this, the chief difference between the Eames and Westinghouse trains was the absence of dead, or lazy levers. In this respect the train was fitted as freight cars are usually fitted, such levers being hardly common enough to form an exception to the general rule.

It should be borne in mind that the competitors were not instructed in respect to the foundation brake equipment. Each brake is responsible for its performance under its special conditions. It is no more fairly to be charged with defects in the foundation brake—which forms no part of the equipment furnished by the competitors—than with the defects, if there had been any, in the track and roadbed on which the tests were made.

JAS. H. SLADE,
Vice-Pres't Eames Vacuum Brake Co.

BOSTON, SEPT 18, 1886.

In olden times every railroad crossing used to display the sign, "Look out for the locomotive when the bell rings." This gave place to the more abbreviated motto, "Look out for the locomotive." Now all that is put up is simply "Railroad crossing." An eastern engineer, commenting on the carelessness of the average farmer in crossing a railroad track, suggests that we adopt the motto, "Prepare to meet thy GOD."

Reform in Live Stock Shipments.

There appears to be some prospect that a reform that is much needed will soon be effected in the way of charging for the transportation of live stock. Commissioner Blanchard of the Central Traffic Association has issued a circular giving notice that the executive committee has ratified the action of the Chicago committee, deciding that hereafter all live stock to through and local points in the East must be charged for at actual weight. The railroad and stock-yard agents at all the termini of the Central Traffic Association will not be permitted to make out, or deliver, or accept payment of live-stock expense bills, unless or until the actual weights are known. The Commissioner is authorized to supervise the weighing of all eastward-bound local and through live stock at all the junctions with the trunk lines under uniform systems and conditions, and in such manner as to delay shipments and incommode patrons as little as possible, the expenses thereof at each point to be borne by the roads in the association and their direct connections benefited thereby. It is also recommended that all incoming stock at contract points be weighed and charged at actual weights, and the Commissioner is directed to take such steps to that end as may be in the power of this association and report the same to the next meeting.

This change of policy, if faithfully carried out, will entail supplying weighing machinery to a few stations, but it will end the unceasing demand for larger stock cars. So long as the charge for transporting live stock was based on the car load, the companies having large cars obtain an advantage over those with smaller cars, and it leads to no end of quarreling. The reform will not be completed until it extends to all shipments of live stock North or South, East or West.

Sustaining Combustion by Dead Gases.

An examination of the patent records reveals many curious, wonderful and amusing attempts to perform impossibilities. Our attention was called lately to patents connected with boiler construction through an inventor showing us the model of an improvement he had designed for obtaining more of the heat out of the fuel gases. The man had heard of the advantages obtained in metallurgical processes from the use of a hot blast, and he conceived that what was good for melting iron would not be bad for making steam. He proposed obtaining a hot blast for the locomotive simply by carrying the hot gases from the smoke stack into the ash-pan. There was to be no end of heat saving from the process. It was new information to this improver of the locomotive boiler when we tried to explain that the gases passing out through the smoke-stack were dead fumes that had no more power to sustain combustion than the breath passing from the lungs was capable of sustaining life if drawn separately back again. We are aware that men who knew nothing of nature's laws had previously proposed using the hot dead gases to sustain the living fire, but we are surprised on searching through the patent records to find how often methods to be operated on that principle had been covered by letters patent. A hot blast, or the supply of heated air to sustain combustion in a steam boiler, would no doubt help to maintain a high furnace temperature, a very great aid to economy, but air is so hard to heat, and absorbs heat so slowly from any hot surface it passes over, that there is no hope of ever applying its benefits successfully to locomotives.

Promotion of a Master Mechanic.

Mr. Charles Blackwell, one of the most prominent and useful members of the Master Mechanics' Association, has been appointed acting general manager of the Montana Union Railway. Mr. Blackwell is an Englishman by birth, and is a civil as well as mechanical engineer. He began work in America in the mechanical department of the Grand Trunk Railway, where from 1862 to 1869 he filled different responsible positions. Then he went to the Intercolonial Railway, and was engaged on surveys and construction until 1876. He erected the machinery and principal repair shops at Moncton, N. B., at the same time carrying on the regular construction work of the division. For several years he was engaged as engineer of railway construction in different parts of Canada, and for two years was mechanical engineer of the Canadian Pacific road under the Canadian government, and before it went into the hands of the present syndicate. After a year spent as chief engineer of the Midland Division of the Grand Trunk, Mr. Blackwell went to Roanoke, Va., and took the position of superintendent of motive power of the Norfolk & Western and the Shenandoah Valley railroads, and superintendent of the Roanoke Machine Works, the shops of which were built from his designs and equipped under his directions. While at Roanoke, he introduced a heavy type of consolidation engine, which we have several times mentioned, and which has been so successful that its performance was very favorably commented on in the last annual report of the roads. We are pleased to note Mr. Blackwell's latest step upward in railroad life, and are satisfied that he will prove a credit to any position to which he may be raised.

Englishmen Discussing the American Locomotive.

Considering the fact that business has been extremely depressed in Great Britain for the last year, and that locomotive building shops there are suffering as much as any others from lack of work, it appeared particularly aggravating that British colonies which borrow money from British capitalists to build railways should be found purchasing railway machinery from American makers. So thought our contemporary, *Engineering*, and early this year that paper took up the subject editorially, and threw down the gauntlet for British locomotive builders. After settling, in a very summary way, that American locomotives were inferior in every respect to those of British make, the assumption was made that colonial railway men could not possibly prefer the American locomotive on its merits, therefore the question was raised "How does it come about that American locomotives find any footing on Australian railways?" The catechist was prepared to answer the question, but it could lead only in one direction. "There must be something rotten in this state of Denmark." There was corruption in the political atmosphere of Australia, and certain nameless influences were at work to favor American locomotives at the expense of the long-suffering British workman. The grasping and unscrupulous agents of American houses were reported as being in the habit of working out orders from Australian railway officers, while the innocent lambs who represented British interests sat meekly by permitting themselves to be fleeced. A very wicked place was Australia for English innocents opposed to Yankee shrewdness. In this way *Engineering* explored and exploded the mystery of American locomotives being preferred to the true British article. Meanwhile it was announced that if any one had views to express on the relative merits of English and American locomotives, the pages of the paper were open. Several correspondents responded, and the subject has been under discussion all summer.

The discussion has been a little fitful, but it has been carried on with great vigor, not to say acrimony. The letters have been nearly all written by Englishmen, and not a single American has taken part in the controversy. That those interested in pushing the sale of American locomotives should feel indifferent or reluctant about entering a newspaper controversy is natural. Their machines have made their way all over the world on merit alone, they are still increasing in popularity wherever they are at work, and their performance alongside of other makes is the recommendation that is monthly bringing increased orders; so there was little glory or satisfaction to be had from disputing about questions of designing that admit of much honest difference of opinion.

The controversy brought out nothing that was new respecting either type of locomotive. There is a sort of tradition that Englishmen in their controversies are noted for avoiding the American custom of dragging in personalities, and that they argue from principle and on facts immediately bearing on the case. We never read through a discussion where personalities, having no relation whatever to the subject, were so freely introduced as they were here.

The discussion was just opened by *Engineering* with the explanation that political influence had most to do in introducing American locomotives into Australia, when Mr. J. C. Rodrigues, a Brazilian merchant, living in London, writes to say that he knows nothing about the relative merits of English and American locomotives; but he knows that in Brazil American locomotives are preferred, and that there is no political influence to help them. He mentioned that, on the Government railway there are 118 locomotives, 98 of which are American. On the Leopoldina railway, 16 out of 25 are American locomotives. This mild statement of facts is taken up by an anonymous writer hailing from Glasgow, who contradicts the Brazilian, and sneers at him for not stating reasons why American locomotives should be preferred to these of British make. This kind of argument is followed by several other writers.

The preliminary courtesies being passed, Mr. R. H. Burnett, C. E., appears on the scene, not as a controversialist, but as a writer competent to explain the superior merits of the British locomotive. Mr. Burnett, if we mistake not, was connected with an English locomotive building firm, and went from there to South Australia to fill the position of locomotive superintendent. While there, he remained true to his antecedents and was noted for his antipathy to American railway machinery. Mr. Burnett, who is no doubt a thoroughly competent authority on the locomotive, begins by intimating that most people who talk about the difference between English and American locomotives, do not understand what they are talking about. The superficial peculiarities of the American locomotive are, he says, "the giant lamp and balloon-shaped chimney in front; the tolling bell and ornate sand-box and steam domes above; the naked-looking frames and wasp-like attachment between the cylinders and wheels beneath, and the brilliant display of gilt and paint in all directions." The important differences, he says are: "Bar frames in American engines in place of plate frames in those of English make, and the modes of attachment of the cylinders to each other and to the

frames peculiar to each system; the use of cast-iron wheel centers in American engines in place of wrought-iron ones as in English practice; the adoption of iron or steel plates and stay-bolts for the inner fire-boxes of American locomotives in place of copper plates and stay-bolts as in English engines; the use of iron tubes in the former, in place of brass ones in the latter; and lastly, the practice of supporting the tenders of American locomotives on bogies, instead of six independent wheels as in English practice.

These differences Mr. Burnett takes up in detail, and finds fault with the American practice in every instance, some of his objections being rather amusing. For instance, he thinks the practice of casting the cylinders so that they can be bolted together in the middle is bad, because it prevents the valves from being placed between the cylinders. He is particularly severe on the American bogies, calling them as poor specimens of workman hip and material as could well be applied to a locomotive engine, being for the most part combinations of rudely-bent bars and paltry bolts and pins, such as one might expect from the hands of a country blacksmith of limited resources. This description appears to be substantially correct, yet the same truck is one of the most durable and least troublesome members of the engine, and performs its functions just as well as the conglomeration of riveted plates from which our English friends construct their expensive bogies.

After the castigation which Mr. Burnett gave the American locomotive, it looked as if no Englishman would have the temerity to utter a word in its favor, but Mr. W. H. Booth, a Manchester man, ventures to suggest that Mr. Burnett may be a little prejudiced, and that some of the alleged defects may not be without their advantages. He thought the bar frame made the engine more come-atable; that the advantages of having the valves operated directly from the link were not unmixed, for the exhaust of English locomotives was notoriously "dog-legged." The simplicity of design which enabled a country blacksmith to repair an American locomotive could hardly be looked upon as a fatal defect.

For these liberal views, Mr. Booth was soundly berated by succeeding correspondents, who bring against him the heinous charge of being a friend of American locomotive builders, and of being the author of an epistle bristling with contradictions and absurdities of all kinds.

A correspondent having mentioned a recorded performance of a locomotive belonging to the Philadelphia & Reading road (engine 169, Jersey Central Division) as being worthy of any country or kind of engine, the valiant Burnett comes out with an array of figures backed by a Stroudley locomotive, and proves to the satisfaction of himself and friends that the Philadelphia & Reading engine was a wretched machine and the performance unworthy of mention.

While this is going on, and a small fry of anonymous writers are sticking their beaks into the American locomotive, a strong champion appears in America. Mr. John Fernie, C. E., member of the Institution of Civil Engineers, is an English mechanical and metallurgical engineer of large experience, who has made the subject of American locomotives a special study. He learned the machinist trade in the famous Bury Locomotive Works, where our bar frame originated. He came to America fifteen years ago and examined machinery with great minuteness. He was here during the Centennial Exhibition, and not only studied through the magnificent display of machinery at Philadelphia, but visited all the principal locomotive building and railroad shops in the country, seeking for information. Since 1881 he has resided in this country and continued his studies and observations of railway machinery. Still, he is a loyal British subject, with the best interests of Britain at heart. Believing that Mr. Burnett was leading England into a fool's paradise by praising the English locomotive at the expense of the American one, he wrote defending the mechanical merits of the latter.

His first letter defines very plainly the leading difference in the locomotives of the two countries, and the case is argued on the lines: Which is the cheapest in first cost and in maintenance? Which is the safest and most reliable? Which is the easiest worked? Which will keep longest on the road? Mr. Burnett had admitted that an American locomotive cost some $1,600 less than one of English make, but attributed it to inferior material and workmanship. Mr. Fernie proceeds to prove that the American material is better adapted for the purposes to which it is applied than that used by English makers, and that the reduction of cost is in a great measure due to superior methods. Of the crank axle he says: "The American engineer, in eliminating this dangerous element from his engines, and showing how safely and economically the work can be done with the outside cylinder engine and straight axle, did a great thing for engineering science." The bar-frames, steel fire-boxes, iron tubes, cast iron wheels and bogie trucks are all taken up in succession and their use vindicated as sound mechanical engineering. This combination, supplemented by clever designing, skillful selection of material and sound workmanship, is what makes the American locomotive popular with colonial engineers, who say they can buy the American locomotive cheaper and operate it at less cost than those of English make. Mr. Fernie concludes by estimating that English railway companies would save $992,000 annually by getting their locomotives built in America.

The patriotism which induced Mr. Fernie to write in defense of what he considered the best locomotive, is of a nature that the average Englishman cannot understand. If there is any species of mental tonic that the ordinary John Bull hates and despises more than anything else, it is the expression of wholesome truths intimating that some foreigners can do things as well as Englishmen. For a native to say this is regarded as the rankest treason. Mr. Fernie was called are sorts of hard names by the small-souled tribe of his countrymen, but the real point at issue—his proof that the American locomotive was the better engine—remains unbroken.

We shall notice only one of his assailants, and that because he attempts to pose as an authority on the American locomotive, and because in his case the American locomotive is attacked in the house of its friends. For the last year or two an English draftsman, named Neale, has been employed in the office of one of our railroad journals. This man is noted for seeing everything relating to American railroad machinery through the spectacles of English prejudice, and he felt personally aggrieved at Mr. Fernie's opinions. So he plunges into the controversy baited with corrections, and strives first to ruin the reputation of the bar frame. He assures the engineering world that the bar frame is such a miserably defective appliance, that he has known cases where whole lots of engines had to be taken out of service to have the frames rebuilt, and that, too, after it had taken fifty distinct welds for each frame. On the question of steel being superior to copper for fire-boxes, he said it was largely a question of how much lime there was in the water; but in his mind there was no question but wheels of English make were rapidly taking the place of American cast-iron wheels, which were so dangerous that he had known them break on the same train two nights in succession.

In reply to this and a great deal more of the same purport, Mr. Fernie says that Mr. Neale makes a mistake very common with English people who come here for three months, and thinking they know everything, rush into print. Mr. Neale has not learned much, because he came here with a biased mind: he has studied the bar frame, but how little he knows about it; he has studied the chilled wheel, but he has never tried to break one. He knows nothing of the Wootten engine, etc.

That sort of writing puts Mr. Neale in a fury of indignation, and he indites a hysterically worded letter, intimating that he is a very important personage, indeed, the friend, associate and bosom friend of the leading railroad dignitaries of America, and altogether a greater man than persons in America suspected they had among them, but he fails to show that he knows anything about the American locomotive, although he disparages its method of construction. Here the matter rests for the present.

Steel-Tired Wheels on the Boston & Albany.

Mr. F. D. Adams, General Master Car-Builder of the road, has made the following report in regard to the service of steel-tired wheels:

"We had running December 31, 1885, 1,493 33-inch Hartford Steel Tired Wheels, as per individual mileage report. Of this number 11 wheels are running between 400,000 and 500,000 miles; 135 between 300,000 and 400,000 miles; 458 between 200,000 and 300,000 miles; 463 between 100,000 and 200,000; miles and 426 less than 100,000 miles.

"Of this number, 327 wheels have made between 100,000 and 150,000 miles before first turning; 75 have made between 150,000 and 200,000 miles before first turning; 46 have made between 200,000 and 300,000 miles before first turning; 8 have made between 300,000 and 400,000 miles before first turning; 42 wheels are now running between 150,000 and 200,000 miles and have never been turned; 21 wheels are now running between 200,000 and 300,000 miles and have never been turned; 1 wheel is running between 300,000 and 400,000 miles and has never been turned.

"Of the Washburn Car-wheel Co.'s 33-inch steel tired wheels, we have removed for the year, as condemned for passenger service, 102 wheels; their average mileage has been 281,672 miles. The 102 wheels averaged 112,433 miles before turning; 95 averaged 83,634 miles after first and before second turning; 89 averaged 58,901 miles after second and before third turning; 56 averaged 46,940 after third and before fourth turning; 29 averaged 40,724 miles after fourth and before fifth turning; 15 averaged 34,129 miles after fifth and before sixth turning; 6 averaged 27,597 miles after sixth turning.

"Of 33-inch Allen Paper Wheels the total number in service December 31, 1885, was 348. 177 removed for first turning averaged 69,472 miles; 62 removed for second turning averaged 42,499 miles; 25 removed for third turning averaged 39,521 miles; 8 removed for fourth turning averaged 30,471 miles; 2 removed for fifth turning averaged 39,202 miles.

"Of 42-inch English wheels the total number in service December 31, 1885, was 220. Of these, 176 removed for first turning averaged 70,598 miles; 36 removed for second turning averaged 79,667 miles."

A LOCOMOTIVE started on the New Jersey Southern some time ago without any one being in charge, and made rather an alarming runaway. She was finally captured by the crew of another engine, but not before the water in the boiler was nearly exhausted and the fire-box scorched. The explanation of the intelligent daily paper reporter as to the cause of the engine getting away is amusing. He says: "The throbbing of the engine loosened the throttle, and the gradually increasing speed was due to the further loosening by the swaying of the locomotive." From all of which we would infer that the locomotive is supposed to throb when at rest like a tired dog.

NATIONAL CAR AND LOCOMOTIVE BUILDER

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EDITORIAL ANNOUNCEMENTS.

Advertisements.—*Nothing will be inserted in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock, construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notices of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR AND LOCOMOTIVE BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

Means of Preventing Boiler Explosions.

The present tendency of steam engineering is to employ increasing pressure on boilers for the purpose of obtaining the greatest possible amount of useful work in return for every pound of coal consumed. In all lines of steam engineering, progress is apparent in the direction of higher pressures, but locomotives still maintain the lead. Mr. G. W. Stevens, of the Lake Shore Railway, is running locomotives with a pressure of 180 pounds to the inch, and 150 pounds per square inch is becoming too common to attempt enumerating the roads using it. As the most economical steam engine, all other things being equal, is that which takes steam into the cylinder at the highest temperature and lets it escape at the lowest, making the greatest difference in the temperature by converting the heat into work—there is a decided advantage in employing steam of high tension, but the practice is not without its disadvantages. With the defective expansion gear used on a locomotive, the margin of saving between an engine carrying very high and one carrying moderate pressure is very limited, but we shall not discuss that point now. Our subject at present is the boiler.

Although the locomotive boiler is higher pressed than any other form of boiler in general use, and although the type is more numerous in America than any other kind, it has made an enviable reputation for causing few violent accidents. This is particularly remarkable, considering the admitted fact that the locomotive boiler is subjected to harder usage from sudden changes of temperature, bad feed water, exposure and shocks of service, than any other boiler used. The immunity of locomotive boilers from explosions reflects the highest credit on the mechanical departments of our railroads, for it is due to enlightened care in design and construction, and to increasing vigilance in maintenance, handling and management. The greater the margin of safety a boiler is constructed with, the easier will it be maintained in safe working order. The tendency of the intense pressures in course of introduction is to reduce the factor of safety, which has never been high. If this is going to increase boiler accidents, the savings obtained from high-pressed steam will prove a costly way of making money.

Among the railroad accidents reported by the *Railroad Gazette*, for May last, were four locomotive-boiler explosions, where three lives were lost, several persons severely injured, and much property destroyed. Out of 30,000 locomotives at work in America, that was not an alarming record of boiler explosions, but it was larger than usual, and emphasizes the fact that eternal vigilance is necessary to prevent this supreme form of accident. With the good material usually employed in boiler construction, there is no difficulty in making the boiler perfectly safe when new. The important problem is to detect the various deteriorating agencies, so that a boiler may be maintained safe. Boiler insurance companies, that make the preventing of accidents the work of highly-trained experts, have demonstrated beyond dispute that proper and thorough inspection, constantly repeated, is the only measure to detect weaknesses before they become the match that fires an explosion.

The Master Mechanics' Association has directed persistent and intelligent attention to every thing relating to boilers, and committees have made emphatic reports recommending systematic periodical inspections of boilers, so that dangerous weakness may be discovered in time to apply the proper remedies. They recommend a hot

hydraulic test to be made on boilers every six months after they are more than two years old, and careful inspection during the test to detect any change of form that may happen to the boiler under pressure. They also recommend weekly inspection with the hammer for broken stay-bolts. The adage of one man being able to take a horse to the water when ten can not make him drink, applies directly to the way many committee reports are treated. A committee can make the very wisest recommendations, but all the persuasion in the world will not make some master mechanics act on them. We know of no committee's recommendations more important for the safe operating of railroads than that referring to inspection of boilers, yet there is no report more neglected. The most serious menace to the safety of a locomotive boiler is broken stay-bolts, and yet it is a common circumstance when an engine goes into the shop for general repairs to find from ten to twenty broken stay-bolts together, and that on roads where regular inspection of these bolts is carried out. A mere hammer test is a very uncertain way of detecting a broken stay-bolt; but if it is supplemented by a carefully conducted hydraulic test, the defects will nearly always be identified. Some master mechanics object to hydraulic tests, and say they are useless and dangerous. Where they prove so, it is not the blame of the method, but of the men applying it. Unless tests of any kind are intelligently conducted they had better be omitted, for a perfunctory test that is a mere form tends to give danger the appearance of safety. The men who use the hot hydraulic test periodically are most decided in testifying to the value of the system; they who apply the test occasionally as a defense in case of accident see no merit in that plan of inspection. As a means of detecting broken stay-bolts we consider drilling the bolt through the outside sheet is the most certain method in use. If that practice is followed, and hot hydraulic tests made every six months as a means of detecting incipient cracks or other dangerous weakness of sheets, there will be little danger of any railroad company having to pay for damage done by boiler explosions.

Draw-Bars and Dead-Blocks.

The extensive interchange of freight cars makes it necessary that there should be some close approximation to uniformity in the height of end-sills and draw-bars above the rails, in order to save trouble in the making up and running of trains. In 1871, when the necessity for standards in car construction began to be discussed, the Car-Builders' Association recommended that the centers of draw-bars should be 2′ 9″ above the rail. This was generally understood to refer to empty cars, although it was not expressly so stated. No attempt was made to change or modify the recommendation until about two years ago, when the question was raised as to whether the proposed height applied to empty or loaded cars. The Association decided that it applied to empty cars, which was in accordance with the original understanding of the matter. During the long period of a dozen years or more, the cars of many roads have been built in conformity with the proposed standard as applied to empty cars. In some instances allowance has been made for weight of load, and quite a number of roads have put in draw-bars without regard to the standard or the practice of other roads.

After a while it became necessary to establish some kind of uniformity in the size and position of dead-blocks, and a dual standard was adopted in 1884, prescribing that the under side of end-sills should be 3′ above the rails and the double dead-blocks 8″ square, which would make the center of the blocks 40″ above the rails and 7″ higher than the center of the draw-bars. On the cars of a good many roads however, the centers of the dead-blocks are more than 40″ from the rail, and the centers of draw-bars considerably higher than the nominal standard of 33″. On the New York Central these heights are respectively 44″ and 33½″; on the Pennsylvania, 42¾″ and 35″; Grand Trunk, 41″ and 33″; Baltimore & Ohio, 44½″ and 35″.

In order to harmonize as much as possible these diversities in practice, the committee on dead-blocks at this year's meeting of the Association, recommended that the centers of draw-bars should not be less than 35″ above the rail for empty cars, nor less than 33″ for loaded ones; and that the centers of dead-blocks above the rail should not exceed 45″ for empty cars, nor be less than 41″ for loaded ones. Both propositions were indefinitely laid on the table after some discussion, in which it was suggested on the one hand that the 33″ height of draw-bar had outlived its usefulness, and that the progressive requirements of railroads in the matter of larger cars and heavier loads, could not be subordinated to an obsolete standard suited only to the conditions existing fifteen years ago. On the other hand, it was very natural that that the roads which had conformed to the 33″ standard should wish to avoid a change which would not only subject them to cost and trouble, but also tend to shake confidence in the stability of any and all standards in freight car construction. The 33″ height of draw-bar had been looked upon as a sort of original pioneer standard that was not to be interfered with, and to abandon it now would only increase the confusion and complication. Moreover, the Railroad Commissioners of the state of New York have recently recommended that all new cars of roads within the State jurisdiction, and old cars also as near as possible, when they are taken in for repairs, shall be made to conform to this standard for draw-bars and also to the standards for dead-blocks already recommended by the Car-Builders' Association.

That there should be disagreement as to standards, and a clashing between standards adopted at different times, is perhaps unavoidable under the circumstances. The progressiveness of railroads and railroad operation renders the maintenance of general standards for any great length of time next to impossible, and even local ones are subject to constant changes. So long as each road or system of roads is a law unto itself to the extent that it now is, there can be no standards except what are made such by the voluntary concurrent practice of each and all, or by the operation of laws, state or federal, compelling every railroad corporation in the land to construct cars in a uniform way in all essential details.

The Silver Creek Collision.

The most disastrous railroad accident that has happened in this country since 1880 occurred on the 14th of September at Silver Creek, N. Y., to an excursion train on the nickel-plate road. Excursion trains have been singularly unfortunate all the world over for meeting with disasters, and this is another sanguinary addition to the list that already counted a long death roll.

On the morning of the day mentioned, a train of 14 cars left Erie loaded with excursionists bound for Niagara Falls. The train was wild, running on orders, one of which was to meet a west bound local freight train at Silver Creek. The engineer and conductor both forgot this order, for the train pulled out at Silver Creek, and had not yet got into running speed when the local freight was met on a curve. In the collision that ensued, the baggage car in front rose over the platform of the smoking car next to it, telescoping the car with such dreadful effect that nineteen persons were instantly killed and a large number injured, four or five of them fatally. There is no doubt that the immediate cause of the accident rests with the engineer and conductor of the fatal train. It has been reported that the draw-bars of the train were of uneven height, and that the baggage car was readily forced upwards through this defect. We do not put much faith in this, for after such an accident it is impossible to tell how the draw-bars may have been previously, and there is no accounting for how cars will act when a train meets a violent collision.

The accident is of a kind that never will be altogether prevented where trains are operated on a single track. With the very best system that can be devised for operating single track, human care and attention must be depended on, and where these fail calamities will happen. Even with regular trains accidents occasionally happen through forgetfulness of orders, and they are much more liable to overtake wild trains, where everything is irregular. A few months ago a regular passenger train on a prominent road had a collision through forgetfulness of orders. The engineer and conductor got orders to meet a work train at a certain station, the engineer showed his order to the fireman, and the conductor gave his brakeman the order to read, in accordance with a wise rule of the road; yet when the meeting point was reached the whole crew forgot the holding order, and the train pulled out, to come in collision a mile or two farther on. Yet that engineer and conductor were among the oldest and most trusted employés on the road, and neither of them ever had had an accident before or made a mistake with an order. The impulse is to call for the punishment for criminal carelessness of the men who brought about the terrible calamity at Silver Creek, yet a mistake like that which led to this accident is sometimes made by very careful men.

The Utility of Slack Couplings.

Several years ago, when Mr. George Westinghouse and Captain Douglas Galton made a series of experiments with brakes on the Brighton Railway, in England, it was discovered that the retarding effect of a sliding wheel upon a rail was much less than when braked hard, but with less force than was needed to stop the wheels revolving. This was an unlooked-for discovery, and the scientific men who were interesting themselves in the controlling of the speed of trains were very much surprised to find that they had been wrong in supposing that the supreme effort of a brakeman was to slide the wheels. The scientists supposed that something new had been discovered, yet there were few observant brakemen who were not previously aware that sliding the wheels was the wrong way to stop a train quickly. Before the Westinghouse-Galton experiments were made, theorists held that the maximum retardation effected by a brake was when the wheels were sliding, and they would have preached this for all time had not accurately recorded experiments demonstrated that they were wrong.

There is some indication that the accurately recorded experiments connected with the recent brake tests at Burlington may have the effect of exploding more theoretical fallacies. It appears that many people have labored under the impression that slack couplings would enable a locomotive to pull a heavier train than the same engine would be able to start with tight couplings. The tests connected with the competing brakes at Burlington indicated that there was not much virtue in slack, and they will give the subject sufficient publicity to have the matter settled with some accuracy. The indications were that the engine used for starting the trains at Burlington found no advantage from having ten or twelve feet of slack; but it does not by any means follow that all locomotives would work as well without slack. All intelligent men who have had close connection with the handling of trains are aware that a locomotive will only pull its load, slack or no slack, but that with slack couplings most locomotives will start more cars than they can keep going. The loose couplings enable the engine to attain a certain velocity before the full load is on the draw-bar, and the kinetic energy of the moving mass starts more cars than the steady power transmitted from the pistons would put in motion; but the velocity is gradually lost, and the engine soon stalls if more than a full load is coupled on. A practical application of power in this way is "slacking" a train over a hill, but it is well known that many engines will not "slack" a train a single rod.

An ordinary locomotive that is "smart" in starting, as all locomotives are with short valve lap stroke of 24 inches, and wheels about 5 feet diameter, will start a full train with enough slack to enable the crank to get off the centre. When an engine of this kind is starting a train that has as much slack as was in the train at Burlington, care must be exercised or there will be couplings broken. In practice, more than a foot or two of slack in a train is never utilized, and it is not necessary with most freight engines, for they can keep a full train moving at two or three miles an hour without stalling. But with what enginemen call "logy" engines, the case is different. A "logy" engine is one that, owing to peculiarities of construction, is slow in starting. Such engines are very liable to stop on the center, and their maximum tractive power is exerted at a speed of six or eight miles an hour. When they get moving slower than that speed they are almost certain to stall. A locomotive of this character will derive decided benefit from slack in starting a train, because without some advantage she will not start a full load, and the slack couplings act like the descent of a short hill. It does not follow because an engine of this sort is incapable of starting a full load, that cars offer more resistance at starting than they do at six miles an hour, as has been frequently assumed.

Observant trainmen know pretty well what different kinds of locomotives can do in handling cars, but information on the subject is not widely disseminated, and the men who merely theorize upon the subject and undertake to teach the general public according to their theories, are the blind leading the blind. There is much yet to be found out about this as well as many kindred subjects of train handling, and accurately conducted experiments would be certain to throw new light on many disputed matters.

Horse-Cars in New York and Brooklyn.

In the matter of neatness, cleanliness and an attractive exterior, the car equipment of the horse railroads in the cities of New York and Brooklyn is not creditable to the companies operating the lines, nor to a great metropolitan community which prides itself on the extent of its local facilities for passenger transportation. It is true, that upon some of the lines the cars are kept in a passably decent condition, but upon others there is a uniform shabbiness in their appearance which calls for a more frequent use of the scrubbing broom and paint brush. The cars of the New York Third Avenue line have long been an eyesore on account of their soiled and unsavory appearance, and yet they are only a little worse in this respect than those of some other lines that might be named that have been less seriously crippled by strikes and boycotts. Even in the "City of Churches," where cleanliness and godliness ought to go hand in hand, the seedy looking cars that are run on some of the lines would present a sorry contrast if they were ranged alongside of those on the street lines of some other cities—those of Boston, for example. This neglect, which is fast becoming chronic, cannot be justified on the plea of low fares or light traffic. The fares, with scarcely an exception, are as high as they are elsewhere, the traffic is heavy and rapidly increasing, and regular ten per cent dividends are the rule. Why, then, should not the cars be kept furbished up so as to be as good as the best? The answer is easy. The patronage is a continuous, dead sure thing, and why should dividends and surplus balances be whittled down the tithe of a hair, even, for such luxurious trifles as sweet smelling cars and bright and showy coats of paint?

It may also be suggested whether the horse-car management in these populous cities could not be improved by the adoption of a ticket system that would facilitate the collection of fares to the extent that passengers might buy tickets. Even if no discount were allowed, the time saved in handing a ticket to the overworked and over-spotted conductor, instead of waiting for him to make change for a dime or a dollar, would be an inducement to buy tickets. Such a system is certainly practicable, and if put in operation great numbers of those who ride regularly every

day on particular lines would avail themselves of it as a matter of convenience; and where the fares are uniform and the traffic heavy, as they are in New York and Brooklyn, the tickets might be exchangeable between the several lines and balances be settled at a clearing office. The practice of collecting every fare in a crowded car in money, with the loss of time involved in making change, is a nuisance that ought to be abated.

Another source of discomfort in our street cars—the open or summer cars more particularly which are run almost exclusively on the principal Brooklyn lines during the warm season—is the incommodious seating arrangement. Each car has ten cross seats made of the hardest kind of hardwood. Five persons of average size can be crowded into each seat, where they sit back to back with those in the next seat, and knee to knee with those facing them in front. The seats are narrow from back to edge, and slightly concave to prevent slipping off. One seat-back answers for each pair of seats, and this back, in order to economize space longitudinally, is of necessity straight up and down. When the car is full, each occupant is in a sort of pillory and half of them must, of course, ride backward. Would it be too much of an inroad on the revenues of the prosperous companies if this semi-barbarous way of carrying people were modified a little by making the seats reversible or by turning the car round at the end of each trip, so everybody could ride facing forward instead of staring at one another at such a disagreeably short range while in transit? The introduction, also, of a little rattan into the seats to soften their adamantine rigidity would be very much appreciated.

Sunday Trains.

It is gratifying to note that the running of freight and passenger trains on Sunday is perceptibly diminishing. For several years the practice seemed to increase correspondingly with the growth of traffic, which was steady and continuous, in spite of the stagnation in general business which followed the panic of 1873. The running of Sunday trains seemed to be a necessity inseparable from railroad operation, and the religious and church-going portion of the community began to fear that familiarity with the practice would ultimately, so far as railroad employés are concerned, make the week consist of seven working days instead of six. The tendency in this direction, however, seems to have reached its limit, and may be followed by a decided reaction, not so much from a sentiment of religious obligation as from purely business considerations. There are no duties more exacting and arduous, or which more imperatively require sound minds and healthy bodies for their proper performance, than those which devolve upon railroad men of every grade, and especially trainmen.

Whether Sunday is identical with the Sabbath of the decalogue is a question for polemics, but there is no question at all that it is a day of coveted rest from week-day toil, and, as such, is appreciated and enjoyed by almost everybody. Every railroad manager knows that more and better service can be got from an employé in six days, when the six days are preceded and followed by a day of rest, than could be got from him in continuous periods of seven days without any intervals of rest. In justice to managers it should be said, however, that they are powerless to abate the evil of Sunday trains unless sustained by a prevailing public sentiment. Road managers are in this matter as much the slaves of the great exacting public as the train hands are of the managers. It would doubtless comport better with the proper observance of Sunday if all trains except those carrying through mails were suspended on that day. But owing to the immense increase of through and local passenger traffic, this is out of the question; and as regards freight trains, the manager may consider it very wicked to keep them on the move in the busy season, regardless of Sunday, but he must not fall behind his competitors nor disappoint the stockholders.

Public sentiment against the running of Sunday trains does not, in fact, amount to much. The practice is condemned in the abstract by the mass of church-going people, but when these people are asked to withhold their patronage from such trains, the boycott does not very alarmingly affect the receipts. Very few people, in fact, can be found among those who are the most outspoken against this kind of sabbath-breaking who will not readily patronize a Sunday train in any pressing emergency of business or duty, but in such case the patronage will most likely be justified as a matter of unavoidable necessity, but not the running of the train.

Ladies' Sleeping Cars.

The Albany *Evening Journal* makes a loud complaint about the absence of privacy in sleeping cars, and intimates that unless the railroad companies do something to remedy the evil, self-respecting ladies will decline to travel in such cars except in cases of pressing emergency. It also suggests that if any one of the trunk lines would provide sleeping cars that would secure privacy to passengers at night, its revenues and popularity would be greatly increased. That the promiscuous herding to which the occupants of the ordinary sleeping cars are compelled to submit is a trying ordeal for ladies, can not be denied. The question is, What can be done to abate the grievance without causing new troubles and a chorus of complaint about something else?

Sleeping cars can be built full of state-rooms, the doors of which can be locked and bolted, and each room can be separated from the adjoining ones by permanent partitions sheathed, if necessary, with steel plate. How such rooms are to be made altogether pleasant for the occupants in the day time we do not undertake to say. The main thing is to make them proof against prying eyes and morbid curiosity. The price that would have to be paid for such accommodations would, of course, be commensurate with their cost, and it is needless to say that the general run of plain people with only moderate incomes, would have to deny themselves the luxury of such exclusiveness. It has been suggested that the rosewood, silver-plated trimmings, mirrors, mosaics and other diversified splendors, might be dispensed with in order to lessen the cost.

The Mann sleeping cars, which have already gained a considerable foothold in this country, afford the requisite privacy, and why, it may be asked, are not their advantages in this respect over the ordinary American pattern, more widely appreciated by the great passenger lines and by the traveling public? Or why do not some of these lines try the experiment of running one or more sleepers in each train, to be used by ladies exclusively, such cars to be provided with female attendants, and into which no conductor or brakeman shall be allowed to intrude during the night hours? Complete privacy could thus be secured to the occupants collectively, leaving them to apportion it among themselves according to their individual tastes and temperaments. In the emergency of accidents, however, the seclusion would of course have to be broken in upon; but would there be no trouble at other times? How about the lavatories, of which there would be but one at each end of the car? Assuming that two ladies could make their toilets in each wash-room at the same time, and be limited to half an hour for doing it, then eight ladies could put themselves through in an hour, sixteen in two hours, and so on. But suppose some of them could not get through with the back hair, the curl papers and the crimping within the allotted time, and should be so unreasonable and selfish as to abuse privileges. How could they be dislodged so as to make room for others when the half hour was up? In no way that we can see, but to put on the brakes, read the riot act and cry fire, a procedure that would throw the whole train into confusion and bring the experiment of running ladies sleeping cars to a premature end.

The Freight Car Brake Tests.

We print elsewhere the proceedings of the joint meeting of the committee of the Car-Builders' Association on freight car brakes, and the representatives of the brake companies participating in the Burlington tests, held in New York, September 16, by which it will be seen that the endurance tests as originally proposed have been abandoned, and that a new series of tests are to be made in April, 1887, in which the late competitors at Burlington, and any new ones that may desire to do so under the rules and conditions to be prescribed, can take part, the brake gear to be fitted up in such manner as each competitor may think best calculated to show its effectiveness. The tests to be made in April are to be followed by an endurance or final test, the details of which are to be arranged at a joint meeting to be called in February.

In the meantime, the cars of all the Burlington competitors except those of the Rote company, have gone into service as they came from the tests. It is said that the Westinghouse and Eames companies desire to have the endurance records of their cars made, with the expectation of showing less cost for repairs. Some modifications will probably be made in the brake gear of the American company's cars to be entered for the April tests, and also in that of the Widdifield & Button cars.

Rear-End Collisions.

There are hundreds of rear-end collisions happening with railroad trains every year that never get into print, for railroad companies do not court the publicity which publishing the details of every accident gives, and they generally manage to have accidents unaccompanied by loss of life or injury to persons passed without notice. Yet the regularly published monthly records of train accidents continue to indicate that rear-end collisions are fearfully common and that they appear to be on the increase. It is, however, significant that by far the largest number of rear-end collisions now happen by freight trains running into other trains delayed on the main track. It is not very many years since it was the fast passenger train of the period that did the running into the trains supposed to be protected by the brakeman who fails to get away from the rear car; but the good braking power that all passenger trains now possess gives them the means of stopping in most cases when they come upon a train standing on the main line without protection. In a late monthly record of accidents reported by the *Railroad Gazette*, there are 27 rear-end collisions mentioned, only five of which were due to passenger trains running into trains on the main track. Three passenger trains had collisions by switches being misplaced and leading them into sidings, and one passenger train ran into cars blown out of a siding at night, the four latter being accidents that no amount of brake power could guard against.

The late brake tests having plainly demonstrated the practicability of using automatic or continuous brakes successfully on the longest freight trains, it may be expected that the application of such brakes to freight rolling stock will proceed rapidly. One of the first effects of this most desirable improvement in the means of stopping freight trains will be the reducing of expense caused by rear-end collisions. Accidents of this character are extremely expensive to some roads, and represent annual losses that would equip many cars and locomotives with power-brake apparatus. The saving of time in the movement of freight trains, which are now run slowly and unsafely through the want of proper braking power, will be another element that will make good brakes a paying investment. The sooner railroad managers come to regard the automatic freight brake question as one that admits of saving as well as of expenditure, the better will it be for railroad interests, for public interests, and for the interests of suffering humanity.

SOME parties in St. Louis are hankering after a new first-class railroad paper. The merchants and railroad men about the City of the Bridge have not been celebrated for giving liberal encouragement or support to the papers of this class. The demand for a new railroad paper in that locality reminds us of a little story. There was once in Missouri a family with a crowd of gaunt children that existed in a state of semi-starvation. A sympathetic neighbor, who had been in the habit of helping the family, met one of the boys one morning and asked, "Have you got any flour in the house, Tommy?" "No," said Tommy, "but we've got a new dog." We are afraid a new railroad paper in St. Louis would fare like the new dog.

IN our last issue we commented at some length on the peculiarities of the wear of tires, as noted by several observant master mechanics. Since then we have received another curious record of the mileage made by one set of tires. Up to the first turning they ran 14,000 miles to $\frac{1}{16}$ inch of wear; but they only ran 3,000 miles to the $\frac{1}{16}$ inch of wear, when they had to be turned again. Then they made 21,000 miles, 9,000 miles and 26,000 miles to the $\frac{1}{16}$ inch respectively between turnings. If other master mechanics or master car-builders will furnish us with more particulars on this subject, we will hold ourselves under obligations for the same.

SOME time ago, when a number of locomotives were under construction for the Brooklyn Elevated railroad, we looked over the drawings, and found that the engineer in charge had designed the driving boxes of cast-iron. We urged him to change the box to bronze, assuring him that he would have trouble with the brasses in iron boxes of that small size getting loose. He was of a different opinion, and, being a "C. E.," was above taking advice, so the engines were built with the iron boxes. A great many of the boxes have broken in service, and there has been constant trouble with loose brasses. They are now putting in bronze driving-boxes.

OUR friend Watson, of the *Mechanical Engineer*, appears to have taken some interest in railroad cars during his summer vacation, and did not find them, or at least their occupants, all that fancy has painted. He wishes the attention of car-builders directed to the necessity of arming the outside of the seat-back with needle-points, so that the invertebrate occupant behind could not brace his knees against it. One of the minor miseries of railway travel, he says, is the back-boneless man behind, who braces his knees against his neighbor's back-bone. In regard to this detestable practice, it may not be amiss to say that we have in years past repeatedly called attention to it and have suggested a similar remedy.

WE have received from Mr. David Joy, of London, a lengthy communication in reference to the questions at issue between him and Messrs. Grüninger and Strong in the matter of improvements in locomotive valve gear. As there is nothing in Mr. Joy's letter of special interest to our readers, or that is calculated to put the disputants upon better terms with each other, we must consider the discussion in our columns as closed.

MR. COLEMAN SELLERS, of Philadelphia, the well-known mechanical engineer and machine maker, was so ill when the American Society of Mechanical Engineers of which he is president met at Chicago in May, that he was unable to be present. Mr. Sellers is now residing in Scotland in hopes of having his health benefited by the bracing atmosphere of that climate, but we understand the improvement is by no means marked.

THE New England Railroad Club held its first meeting for the ensuing season on Thursday evening, Sept. 9. The subject for discussion at the October meeting will be "The Interchange of Cars, Including Inspection at Interchange Points."

New Publications.

RECENT LOCOMOTIVES: Illustrations, with descriptions and Specifications and Details of Recent American and European Locomotives, reprinted from the Railroad Gazette. Enlarged Edition: Including a chapter on Compound Locomotives.

This volume is uniform in size and binding with the one published three years ago with the same title. The original volume contained engravings and descriptions of some seventy locomotives which had appeared in the *Railroad Gazette* previous to 1883. The present volume contains upwards of 300 additional engravings, with full descriptions of some 50 locomotives, built since 1882. The illustrations occupy nearly two-thirds of the book, and are printed on both sides of the leaves, instead of one side as in the previous volume, thus nearly doubling their number without increasing the size of the book. This publication, like its predecessor, is not intended to be a complete and systematic treatise, but is merely a collection of engravings and descriptive details, the most of which have already appeared in the *Gazette* during the period between 1871 and 1886. The collection embraces the leading varieties of construction in freight and passenger engines of standard and narrow gauge, with valve gear and other details, and is intended to represent recent practice in America, England and the Continent of Europe. Special attention is given to the Consolidation type of engines, of which six examples are given, the most prominent of which are those of the Norfolk & Western and of the Pennsylvania road (class R). Some 15 pages of descriptive matter are devoted to the compound system in its application to locomotives, the latest examples of which are elucidated by engravings and descriptions. The collection also includes some engines of peculiar construction which are not now in existence—the well-known Fontaine nondescript, and the single driver fast express engine built for the Philadelphia & Reading road in 1880, and designed to run on the Bound Brook route.

The contents of these two volumes will be widely appreciated by railroad men, locomotive builders and others who are interested in tracing the progressive stages of construction and improvement. Published by the *Railroad Gazette*, 73 Broadway, New York.

Spear's Improved Car Heater.

Some improvements have recently been made in this well-known system of heating and ventilating passenger cars, that give it additional claims upon the attention of railroad men. The improvements consist of a new open work top-plate, base-ring, and an ornamental Russia iron heat screen, which deflects the radiated heat upward through the top-plate and outward toward the front of the heater away from the woodwork of the car. Additional means are also provided for the removal of dust and cinders without disturbing the heater; also brass register plates which require no attention and cannot be clogged or accidentally closed.

Two of these heaters are placed in a standard size coach, one at each end, and above them on the car roof is an automatic valve ventilator which admits the air from the forward direction when the car is moving. It is then conducted to the base of the heater and around it, then along the car sides to registers under or between the seats and close to the floor, causing an upward movement toward the top ventilating windows, where it passes out, the exhaust being regulated by the extent to which the windows are opened. Each heater is furnished with a new heat and draft regulator, placed in the smoke pipe, on top, by which the fire is kept under perfect control.

A Contest of Polishing Machines.

A competitive trial of rival sandpapering machines has been in progress during the past month at the Robert Mitchell Furniture Co.'s factory, in Cincinnati. The Egan Co., of Cincinnati, and the Berlin Machine Co., of Berlin, Wis., each placed one of their 30-inch improved machines side by side, the one doing the best work and the most work was to be selected. Both machines were handled by experts, the latter company having three or four of their best men to run its machine. The prize was awarded to the Egan Co., its machine having done the best work and the most of it; and the machine of the Berlin Co. was ordered to be taken away. The result is a triumph for the Egan Co., which has been doing a large business of late in these machines, especially in the Eastern States, where better machinery is more wanted than ever before.

AT the beginning of this month, Mr. J. G. A. Meyer goes to work on the editorial staff of the *American Machinist*. For the last six or eight years, Mr. Meyer has been chief draftsman of the Grant Locomotive Works, Paterson, N. J., and his name has become familiar to the engineering world through articles he has been contributing to the paper he now becomes permanently connected with, on topics relating to locomotive construction. Mr. Meyer is a clear, vigorous writer, and an engineer of wide experience. He learned the machinist trade in England, and by his own exertions acquired an excellent scientific education. On coming to America, he worked for a time on marine engine work, at Chester, Pa., and at the Morgan Iron Works, New York. When General McClellan was in charge of the Department of Docks, Mr. Meyer was chief draftsman, and planned some of the most important work executed at that time. We consider the *American Machinist* is fortunate in securing the services of Mr. Meyer.

MR. WM. H. WILEY, of the well-known publishing firm, Astor Place, New York, and the treasurer of the American Society of Mechanical Engineers, has become American agent and correspondent of *Engineering*, and he is giving our London contemporary long and interesting letters about American engineering matters. His account of the meeting of the American Society of Civil Engineers, at Denver, contains numerous views of the striking scenery and engineering works to be seen in Colorado. The photographs of the views are reproduced by a sort of photogravure process that gives a very faithful impression of the photographs. During a recent visit to the office of *Engineering*, in London, we were shown, by Mr. James Dredge, some excellent engravings taken direct from photographs. The lines are very shallow, but Mr. Dredge assured us that the plates do not fill up in the press so as to cause delay. This is a line of engraving in which the British artists are decidedly ahead of their American rivals.

THE *Railway Service Gazette* is the name of a new weekly paper published at Toledo, O. It is handsomely printed, with an attractive cover, and is designed to be a compendium of railway news in reference to the interests more especially of railway employés of every grade. It is under the editorial management of Mr. Wm. R. Leflet, who has for many years conducted "The Railroader," of which the new paper is the successor. Mr. Leflet's experience and ability as a journalist, and as the stanch advocate of all reforms affecting the interests of railway employés, cannot fail to secure for the new venture the success which it merits.

THE WATTS-CAMPBELL CO., of Newark, N. J., have issued a most handsomely illustrated catalogue of the improved Corliss engines they build. We know the Watts-Campbell Co. are noted for the excellent quality of machine work produced at their establishment, and in getting out the catalogue they have made the illustrations and letter press worthy of their own work. In a phenomenally modest way, attention is directed to the merits of the engines built by the firm, but an excellent essay on steam engineering is used to prove the advantages of the Watts-Campbell Corliss engines. This is the kind of catalogue that is not likely to find its way into the waste basket. The lover of art will preserve the little book for its admirable engravings, and practical men will treasure the catalogue for the valuable hints it contains on steam and the steam engine.

THE Scarritt reclining chair for railroad cars, although but recently introduced, is steadily growing in popularity on its merits. It is made entirely of malleable and wrought iron, is rotary or stationary as may be desired, has a perfect foot and heel rest and a spacious seat and back admirably designed to promote the comfort of the sitter. It has proved highly satisfactory to the roads upon which it is in use, and has also been adopted by the Pullman Palace Car Co.

MR. RALSTON JONES, formerly General Superintendent of the Union Iron & Steel Co., of Chicago, also General Manager of the Keystone Bridge Co., of Pittsburgh, has taken the Agency for the sale of F. W. Thayer & Co.'s Car Brasses, Bronze and Brass Castings, Babbitt Metals, etc., with office and sale rooms at 107 Dearborn street, Chicago.

THE Woodruff Sleeping Car Company is doing a large business and has increased its territory 100 per cent. in the last two years. General Manager John C. Paul says that the company has built 17 new cars this summer, which he thinks is more than any other sleeping car company has turned out.

THE Cincinnati Corrugating Co. have recently made a large shipment of their corrugated iron siding and packed standing seam roofing to the sacred city of Jerusalem, Palestine, Asia.

THE MCKEEN CAR COUPLER CO. has been organized, at Easton, Pa., for the manufacture and sale of the McKeen automatic car coupler. The directors and officers of the new company are Daniel Runkle, President; T. L. McKeen, Vice-President and General Manager; W. H. Hulick, Secretary; A. D. Chidsey, Treasurer; Chas. Stewart and James Smith. The General Agent, Mr. J. H. Sheldon, has been long a railroad officer in various positions.

MR. WM. B. JUDSON, proprietor of the *Northwestern Lumberman*, Chicago, has obtained an injunction for infringement of title against Albert H. Hitchcock, proprietor of a weekly paper recently started in Chicago, called "The Lumberman."

THE Philadelphia *Inquirer* says: The ten locomotives ordered for the Reading Railroad under the receivers' car trust recently authorized by the Circuit Court, have been delivered and are now in use on the road. They were built at the Baldwin Works. Five of them are to be used in the passenger service and five for hauling freight trains. In addition, five passenger locomotives have been built at the company's shops at Reading to replace old equipment. These are also in service. The ten new passenger locomotives are more powerful than any ever owned by the company. They are all supplied with the Wootten fire-box. A few slight changes have been made, the most noticeable in the fire-box. On all engines previously built, the top of the fire box sloped down toward the furnace door. In the new machines there is no slope, but the top is continued straight to the front of the fire-box. This secures a rather larger heating area, and consequently increases the power. The new engines have been tried and give perfect satisfaction.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list:

Cumberland & Pennsylvania.—Nathan Binnix, who has for many years been Master Car-Builder of this road, died Sept. 3., at Mt. Savage, Md. The car department will hereafter be merged in that of the Master Mechanic.

Canadian Pacific.—Wm. White has been appointed Superintendent of the Western, vice J. M. Egan.

Lake Shore & Michigan Southern.—T. J. Charlesworth has been appointed Superintendent of the Michigan Division, vice J. E. Curtis resigned, and G. H. Worcester succeeds T. J. Charlesworth as Superintendent of the Detroit Division.

Louisville, New Albany & Chicago.—George Stevens, late of the Chicago, Burlington & Quincy, has been appointed General Purchasing Agent.

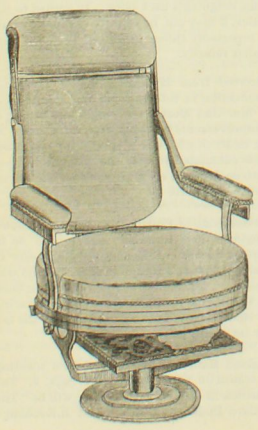
Louisville & Nashville.—O. M. Dunn has been appointed Superintendent of the Memphis Division, vice Wm. Colcamp resigned, and C. Marshall Superintendent of the New Orleans & Mobile Division, vice O. M. Dunn, transferred.

New York, Lake Erie & Western.—George W. Lowe has been appointed Master Mechanic of Mahoning Division of New York, Pennsylvania & Ohio road.

Employment.

WANTED.—A situation as Foreman in a Locomotive Repair Shop. The advertiser has a practical knowledge of locomotive and car work, has had long experience and can furnish the best references. Address "Elmo," office of NATIONAL CAR AND LOCOMOTIVE BUILDER.

WANTED.—By a young married man, a situation as Foreman Car-Builder; has had eleven years' experience in building and repairing passenger coaches and freight cars, and has served for some years as Master Car-Builder for a leading railroad. Can furnish good references. Address "W. N. C." office of NATIONAL CAR AND LOCOMOTIVE BUILDER. 3t.



SCARRITT FURNITURE CO.,

MANUFACTURERS OF EVERY SIZE AND VARIETY OF

Railroad Reclining Chairs,

BOTH OF WOOD AND IRON,

ADAPTED TO ALL PLACES AND PURPOSES FOR WHICH RAILROAD CHAIRS MAY BE USED.

Our Chairs have been adopted by the Pullman Palace Car Co.,

and are in use in Other Styles upon General Managers' and Directors' Private Cars,

and as Car Chairs (although entirely new) upon several of the principal railroad systems of the country, whose address we will be pleased to give to parties interested. This is the Simplest, Handsomest and Best Car Chair yet introduced. Has the only Perfect Foot Rest and Heel Rest. Takes up less room in car, yet gives larger seat than other chairs. **No Crushing of Fingers.** Is Rotary or Stationary at will. Combines more good features than **any** other Chair. Is made entirely of Malleable and Wrought Iron. Special descriptions and prices furnished on application to

PATENTEES AND MANUFACTURERS,

SCARRITT FURNITURE COMPANY, 609, 611 and 613 N. Fourth St., ST. LOUIS, MO

Gentlemen:

How natural it is to try to get *something* for *nothing*, and expect satisfaction in the use of materials that look well, but have no real merit. This is exemplified in painting cars as much as anywhere. The Perfect Method Paints manufactured by us insure durability and saving of time otherwise lost in repainting, or lost by decay of the wood and rust of the iron when the paint has perished, as most of the ordinary paint soon does.

The Sherwin-Williams Co.

Manufacturers High Grade Paints and Colors for Railway Use. CLEVELAND AND CHICAGO.

Established 1856.

Shipman & Bolen, Mfrs. of fine

Railway Varnishes.

Our Varnishes excel in durability,

Newark, New Jersey.

FINEST QUALITY FIRE BOX AND BOILER PLATES By the Crucible and Open-Hearth Processes.

HUSSEY, HOWE & CO. [Limited], PITTSBURGH, PA.

The Oldest Manufacturers of Crucible Fire-Box Plates.

BEST QUALITY TOOL STEEL AND Standard Crucible Spring Steel. Made Expressly for Railroad Use.

GEORGE WESTINGHOUSE, JR., President. JOHN CALDWELL, Treasurer.
T. W. WELSH, Superintendent. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Agent.

THE WESTINGHOUSE AIR BRAKE COMPANY,

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE.

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 15,000 engines and 125,000 cars in all parts of the world. This includes 45,000 freight cars.

The WESTINGHOUSE AUTOMATIC BRAKE is the only continuous brake that has been successfully used on freight trains.

THE AUTOMATIC BRAKE will, in consequence of its quick application, stop a train in the least possible distance.

THE AUTOMATIC BRAKE on freight trains, as in passenger service, applies itself instantly to all parts of the train in the event of the train breaking into two or more parts, a feature of great importance in view of the statistics published in the *Railroad Gazette*, which show conclusively that a majority of the collisions are caused by the breaking in two of trains. (See *Railroad Gazette*, Feb. 12, 1886, page 113.)

THE AUTOMATIC BRAKE also applies itself to every car in the train, in the event of any accident to the brake apparatus of such a nature that it would render any non-automatic continuous brake inoperative.

THE AUTOMATIC BRAKE can be applied from the rear or from any portion of the train, if desired.

THE AUTOMATIC BRAKE will effect an increase of at least twenty-five per cent. in the efficient value of freight rolling stock, owing to the quicker time that can be made on the road, and the avoiding of delay at stations and sidings. Freight trains carrying perishable goods are being daily run on passenger schedules.

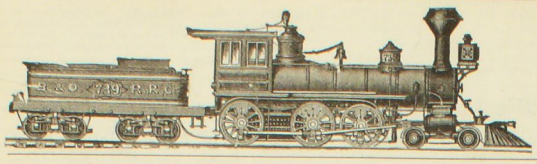
THE AUTOMATIC BRAKE, applied to freight cars, avoids the flattening of wheels and effects a yearly saving, in this item alone, nearly equal to the first cost of the apparatus.

THE AUTOMATIC BRAKE will prevent a greater part of the accidents to freight trains which form so large an item of expense in railway management.

THE AUTOMATIC BRAKE will save employés from the danger and exposure to which they are now subjected, having to ride on the tops of cars in cold and stormy weather, and often sacrificing their lives in the discharge of their duties.

THE AUTOMATIC BRAKE is simple in construction and operation, and cheaply maintained, the working parts being combined in one piece of mechanism.

THE AUTOMATIC BRAKE is not an experiment, but is the result of many years of practical experience, and its capabilities are well known to all railway managers.



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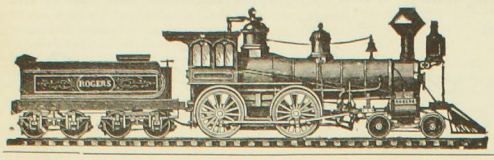
PITTSBURGH, PA.
MANUFACTURERS OF
Locomotive Engines for Broad or Narrow Gauge Roads,
From standard designs, or according to specifications, to suit purchasers.
Tanks, Locomotive or Stationary Boilers Furnished at Short Notice
D. A. Stewart, Prest. D. A. Wightman, Supt. Wilson Miller, Sec. & Treas.



ROGERS LOCOMOTIVE AND MACHINE WORKS,
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New York Office, 44 Exchange Place.
Manufacturers of Locomotive Engines and Tenders and other Railroad Machinery
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RHODE ISLAND LOCOMOTIVE WORKS,
PROVIDENCE, RHODE ISLAND.
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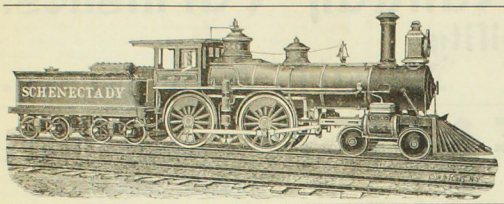
WILLIAM P. CHAPIN, Treasurer. JOSEPH LYTHGOE, Agent and Superintendent.



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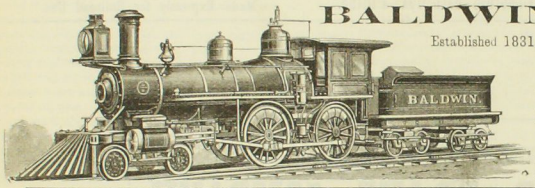
WALTER McQUEEN, Vice-President. A. J. PITKIN, Superintendent.
SCHENECTADY, N. Y.



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Established 1831.
ANNUAL CAPACITY, 600.
LOCOMOTIVE ENGINES,
Adapted to every variety of service, and built accurately to standard gauges and template. Like parts of different engines of same class perfectly interchangeable.
Broad and Narrow-Gauge Locomotives; Mine Locomotives by Steam or Compressed Air; Plantation Locomotives; Noiseless Motors for Street Railways, etc.
Illustrated Catalogues furnished on application of customers.
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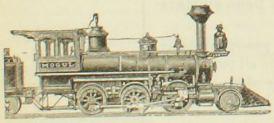
LOCOMOTIVE
BOILER TUBES.
ALL TUBES WARRANTED.



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LIGHT LOCOMOTIVES.
All work steel-fitted and interchangeable. Duplicate parts kept in stock.
Illustrated Catalogue mailed on application.

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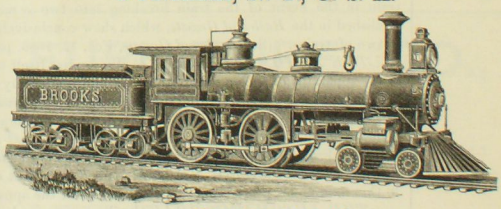

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Crank Pins, Equalizers, Slide-Bars, Connecting, Parallel and Piston Rods. Heavy Forgings of all Kinds of Iron and Steel.
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